HIGHLIGHTS

REVISION NO. 33 Jun 01/10

Pages which have been revised are outlined below, together with the Highlights of the Revision

CH/SE/SU C PAGES	REASON FOR CHANGE	EFFECTIVITY
CHAPTER 77		
L.E.P. 1- 2	Revised to Reflect this revision indicating new,revised, and/or deleted pages	
T. OF C. 1	Revised to reflect this revision	
77-21-00 501- 502, 504- 524	Minor additions and amplification	
77-21-00 604- 605	Minor additions and amplification REVISED INSPECTION/CHECK PROCEDURE OF THE EGT INDICATING SYSTEM.	
77-21-01 402, 408- 409	Minor additions and amplification REVISED REMOVAL/INSTALLATION PROCEDURE OF EGT THERMOCOUPLE HARNESS.	
77-21-04 401- 403, 407- 411	Minor additions and amplification REVISED REMOVAL/INSTALLATION PROCEDURE OF THERMOCOUPLE PROBES.	

CHAPTER 77

ENGINE INDICATING

LIST OF EFFECTIVE PAGES

N, R or D indicates pages which are New, Revised or Deleted respectively
Remove and insert the affected pages and complete the Record of Revisions and the Record of Temporary Revisions as necessary

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RECORD			
OF TEMP.			
REVISION			
L.E.P.	R	1- 2	Jun01/10
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CHAPTER 77

ENGINE INDICATING

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1. General

The engine power management is ensured by :
- indicators
- N1 limit Thrust Rating Panel (TRP)
- the ECAM system (R and L ECAM display units)
- warnings

which are located on panel 4VU of the main instrument panel.
Engine monitoring is carried out by :
- the AIDS
- the vibration measuring of the LP (N1) and HP (N2) rotors on the ECAM display unit.

This technical description note deals only with :
- engine management main parameters (N1, N1 limit (TRP), N2, EGT)
- engine monitoring (AIDS and vibration measurement for the LP and HP rotors).

The other engine power management parameters such as :
- FF/FU, FUEL PRESS are described in chapter 73-00-00.
- OIL PRESS, OIL QTY, OIL TEMP are described in chapter 79-00-00.
- NACELLE TEMP is described in chapter 75-00-00.

2. Component Location

(Ref. Fig. 001)

3. Electrical Supply

(Ref. Fig. 002)

4. Control and Indicating

(Ref. Fig. 003)
(Ref. Fig. 004)

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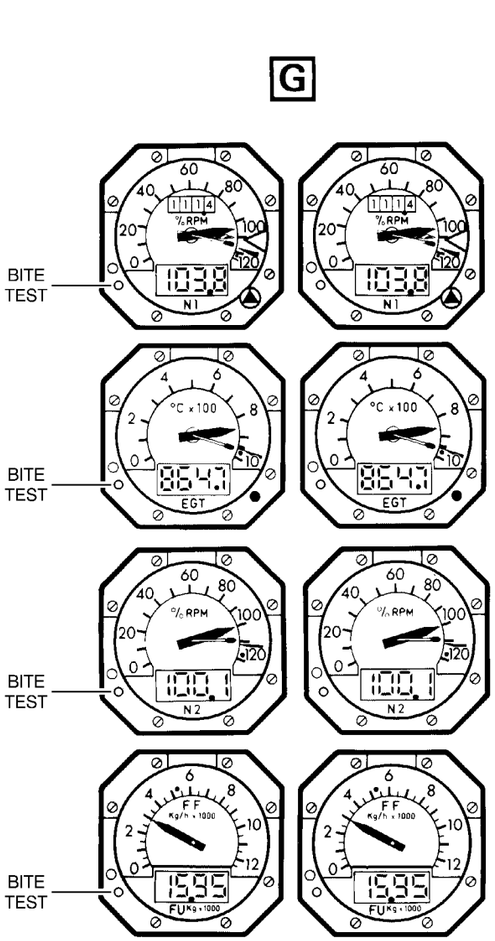

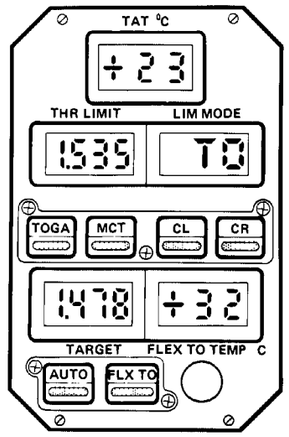

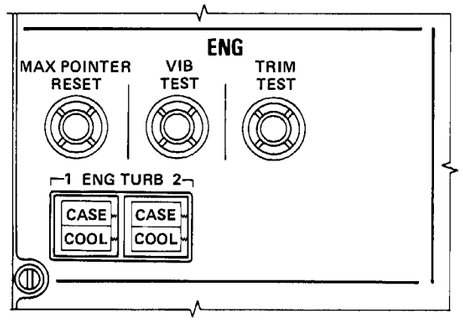

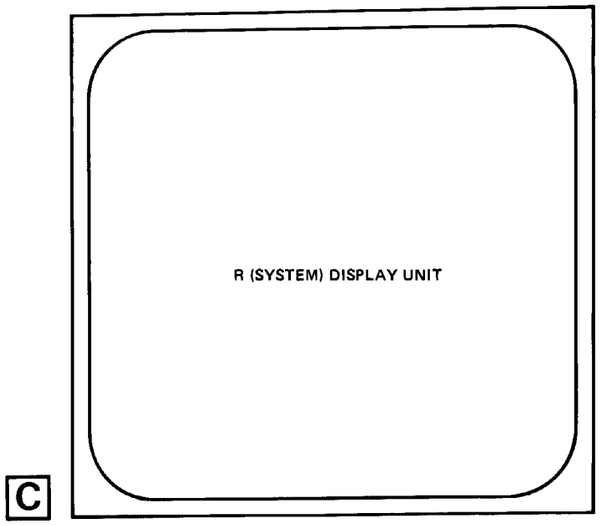

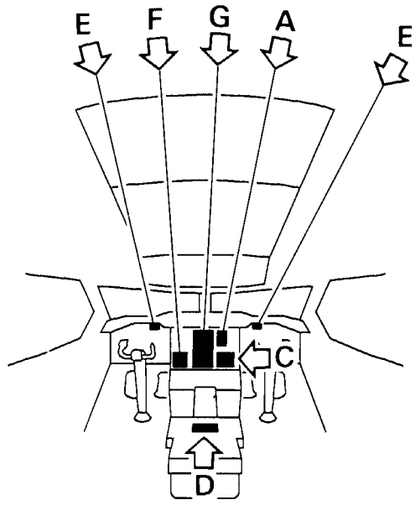

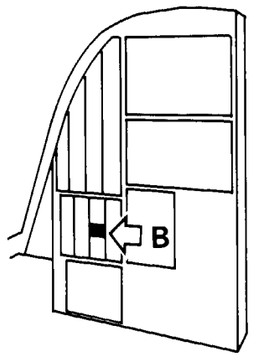

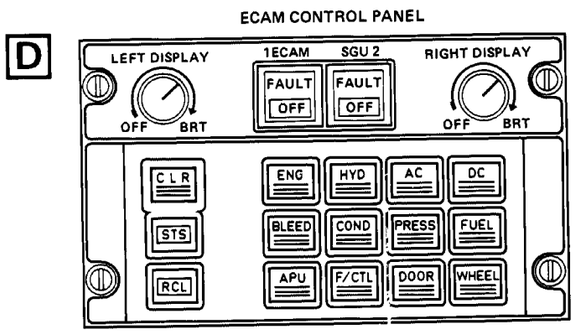

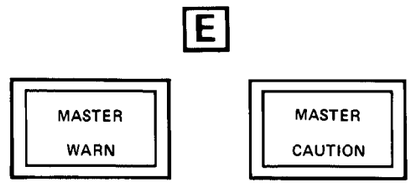

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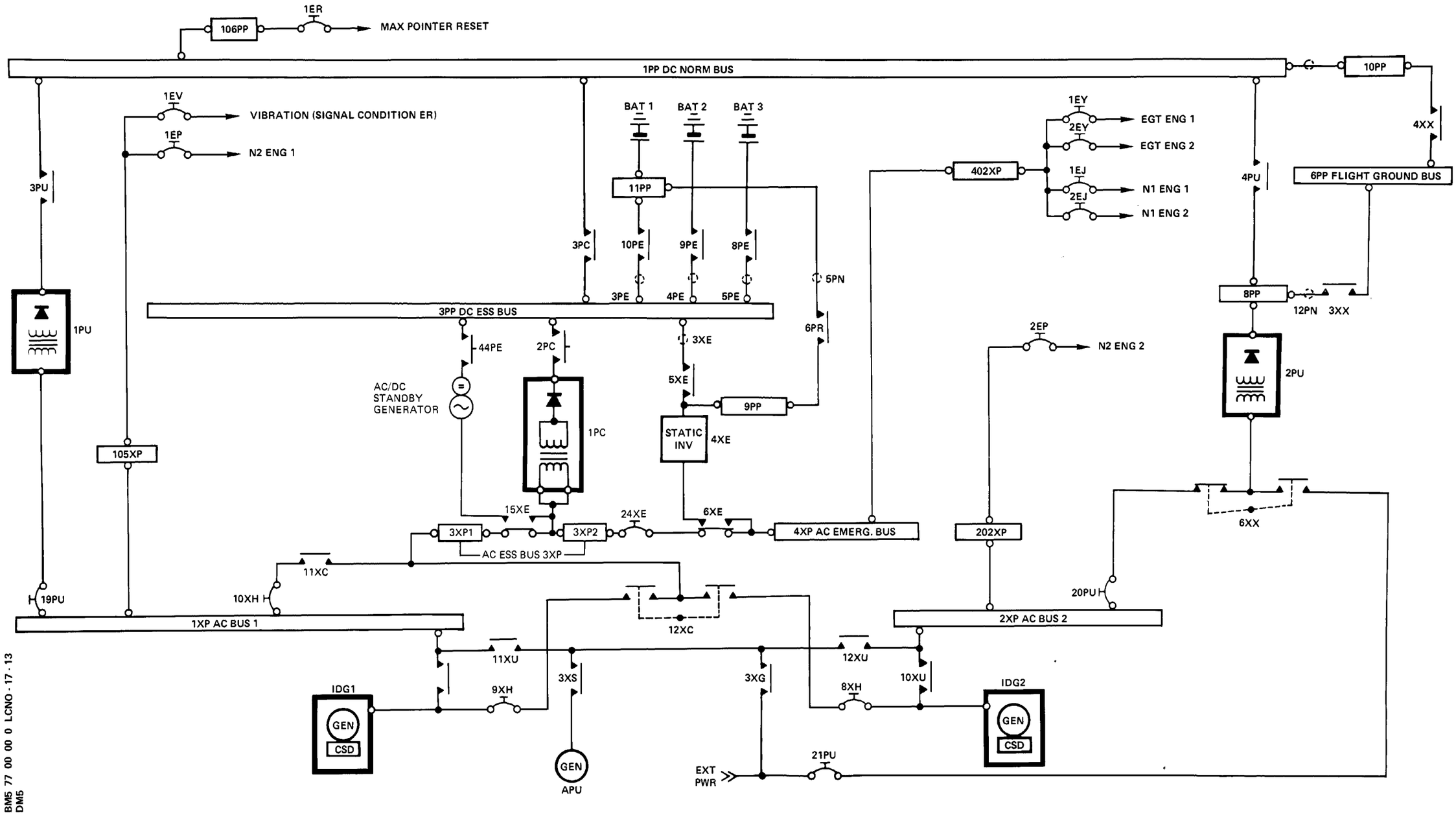
Component Location - Control and Monitoring
Figure 001

R



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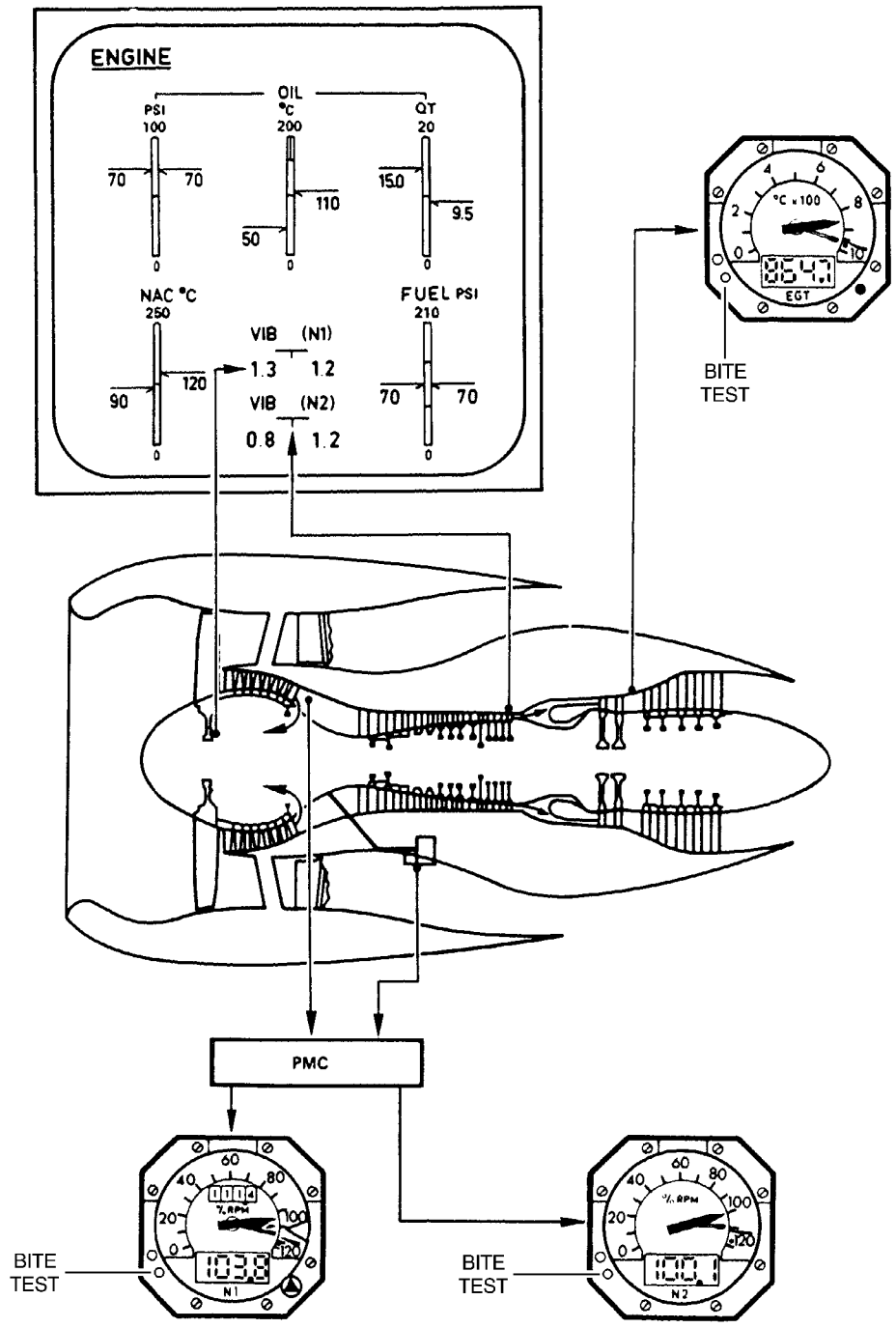
DM5

Indicating System - Electrical Supply
Figure 002



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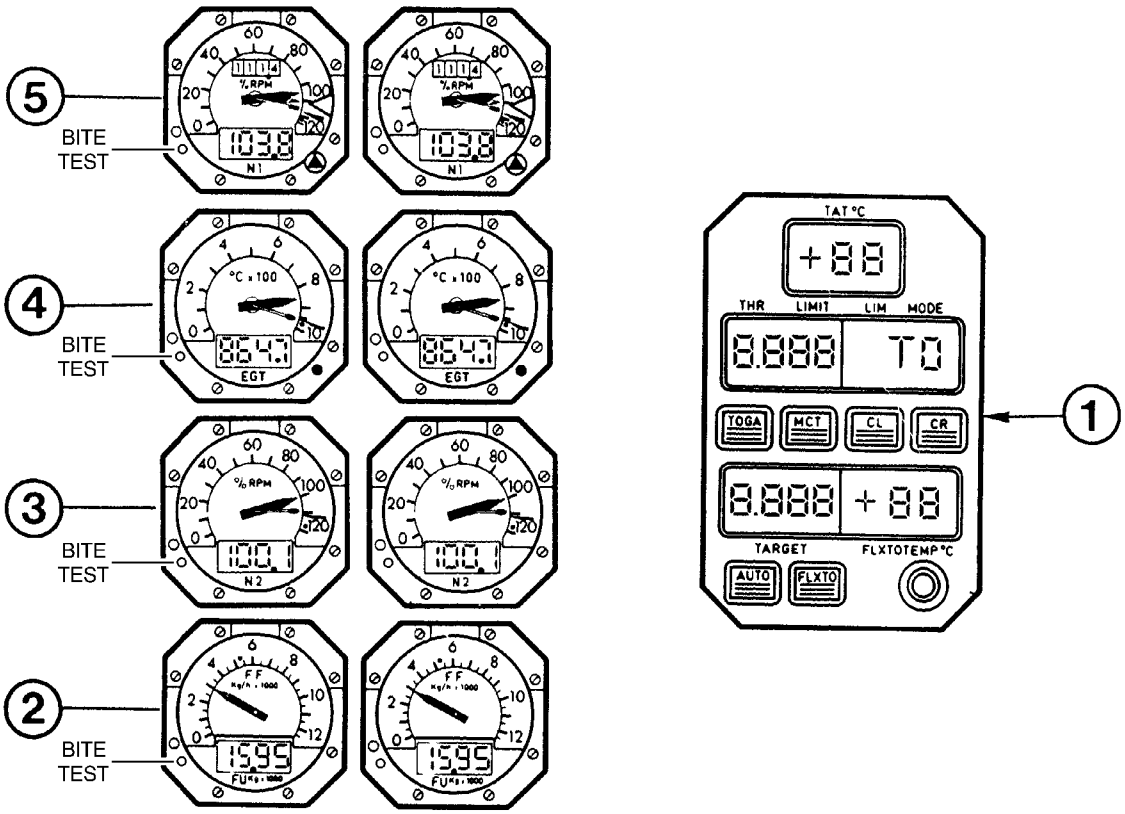
Engine Indicating
Figure 003

R



1. THRUST RATING PANEL (REF. CH. 22-30)
2. FUEL FLOW/FUEL USED INDICATOR (REF. CH. 73-30)
3. N2 INDICATOR
   INDICATES H.P. ROTOR SPEED IN PERCENT
4. EGT INDICATOR
   INDICATES EXHAUST GAS TEMPERATURE AT INLET OF LP TURBINE
5. N1 INDICATOR
   PRIMARY THRUST SETTING PARAMETER
   INDICATES LP ROTOR SPEED IN PERCENT

BM5 77 00 00 0 LGM0 01

R

Engine Primary Parameters
Figure 004

N1 RPM INDICATING SYSTEM - DESCRIPTION AND OPERATION

1. General

The measurement channel for the LP rotor speed (N1) is composed of :
- a speed sensor
- an indicator

for each engine.

Pre GE SB 72-298
(Engines with old N1 sensor, PN1308M20P03).

2. N1 Speed Sensor (Ref. Fig. 001)

The LP rotor speed (N1) is measured by an electrical sensor installed at the end of a tube secured to fan strut No. 3, at 2 o' clock adjacent to the 2R bearing.
It is composed of a disc magnet located at the end of the probe facing 38 tooth wheel, which is connected to the fan shaft. Two separate coils are wound around a core located directly behind the magnet. The passage of the teeth by the sensor modifies the magnetic field of the sensor and induces a sinusoidal signal in each coil.
The output from one coil is sent in analog form to the flight compartment. The output from the second coil is sent to the PMC for engine control. It is also transmitted out of the PMC, in digital form, to the PMUX. The output from each coil is carried on redundant wiring. The design of the sensor is such that the loss of one signal does not result in the loss of the other ones.

End Pre GE SB 72-298
Post SB GE 72-298
(Engines modified with new N1 sensor, PN1383M18P02)

3. N1 Speed Sensor (Ref. Fig. 004)

The LP rotor speed (N1) is measured by an electrical sensor installed at the end of a tube secured to fan strut No. 3, at 2 o'clock adjacent to the 2R bearing.
The N1 sensor has three magnetic coils and an individual pair of signal wires per coil facing a 38 tooth wheel, which is connected to the fan shaft. The passage of the teeth by the sensor modifies the magnetic field of the sensor and induces a sinusoidal signal in each coil. The output from one coil is sent in analog form to the flight compartment. The output from the second coil is sent to the PMC for engine control. It is also transmitted out of the PMC, in digital form, to the PMUX. The output from each coil is carried on redundant wiring. The design of the sensor is such that the loss of one signal does not result in the loss of the other ones.

NOTE : Physical interchangeability is affected in that the new N1 Sensor and Sensor Wheel must be changed concurrently and can only be used with the 9373M29G06 or 1370M99G02 2R Bearing Housing. The new W1 Cable must be used with the new N1 Sensor and therefore changed concurrently.

End SB GE 72-298

R 4. N1 RPM Indicator (Ref. Fig. 005)

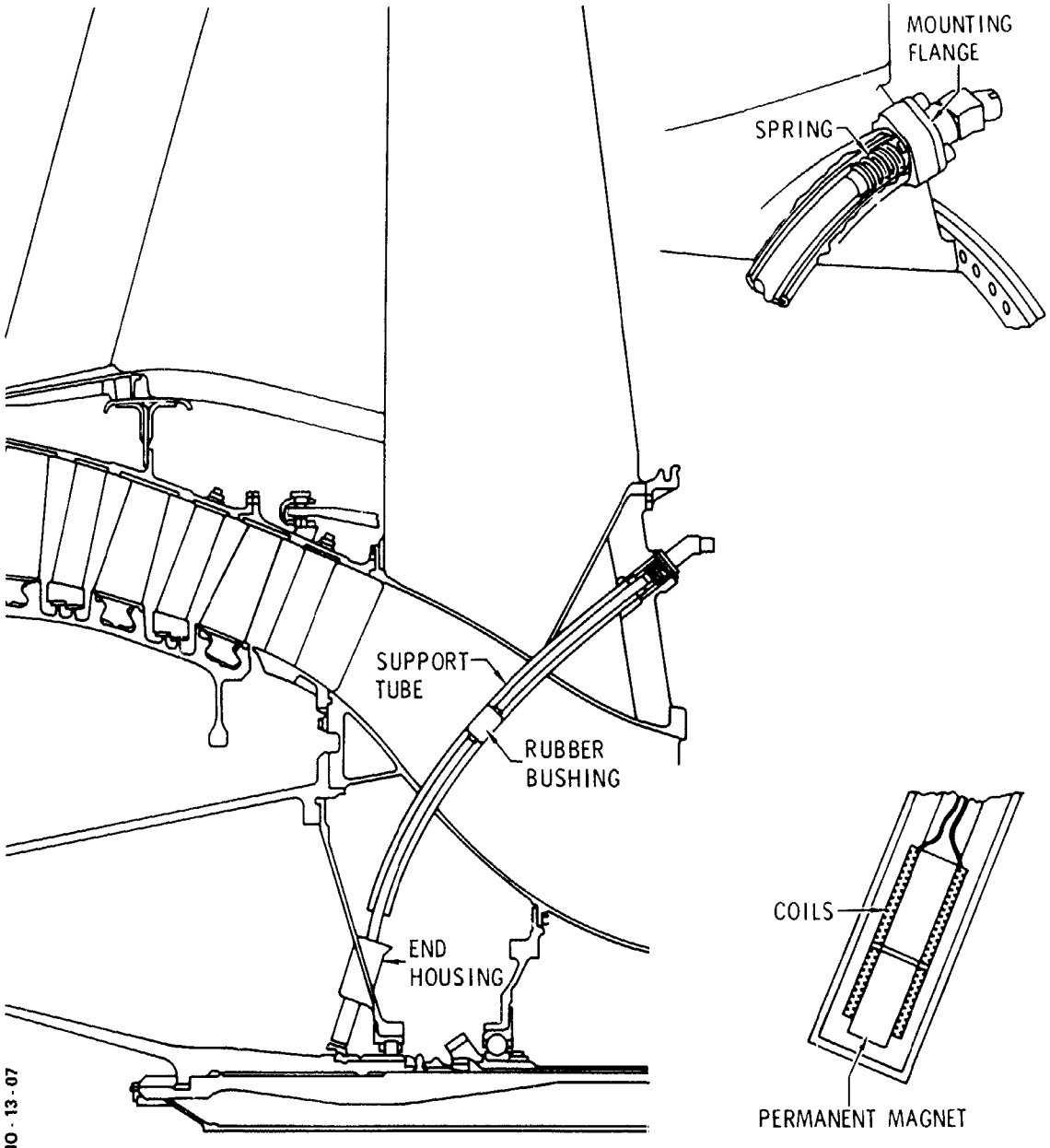
(Ref. Fig. 002)
(Ref. Fig. 003)
N1 RPM indicator is located on the center instrument panel (4VU).

A. Description
The N1 indicator provides :
(1)The analog display of N1 actual value by a pointer deflecting in front of a dial graduated from 0 to 125%. The pointer is deviated by the analog signal which comes from the N1 speed sensor.
In case of failure of the actual N1 analog data, the pointer returns to zero.
In case of loss of the indicator electrical supply, the pointer deflects down to the low stop under zero, partially masking the digital counter.
(2)The digital display of N1 actual value by means of a static display located in the lower part of the indicator (0 to 125%).

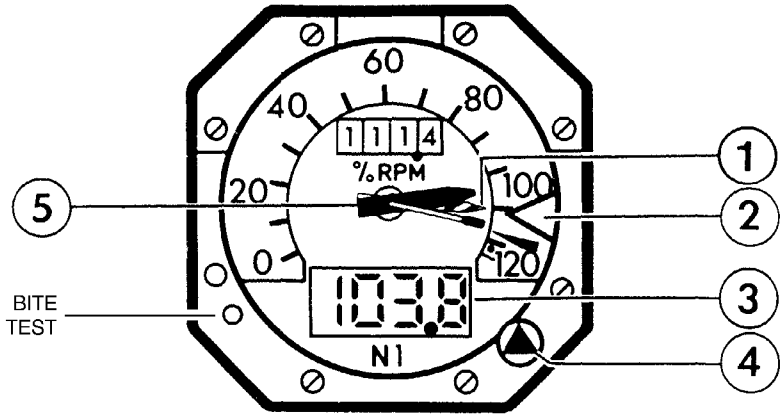
The display is operated by the N1 digital signal from the PMC.
In case of failure of the actual N1 digital data, a flag (----) appears on the actual N1 display.
In case of loss of the indicator electrical supply, the actual N1 digits will disappear (black).
(3)The N1 limit display by means of :
- a bug moving on the dial periphery
- an electromechanical display located in the upper section of the indicator.

This display can be manual or automatic.
(4)The overspeed indication by means of a very thin pointer (black with red end), the standby position of which is 117.5 % (red mark on the graduated quadrant).
An overspeed switch, inside the indicator, closes when N1 actual is greater than 117.5 %, thus transmitting a signal towards :
- amber **MASTER CAUTION** light comes on accompanied by the single chime.
- The **R ECAM** display unit on which appears the **ENGINE** page
- The **L ECAM** display unit, which indicates to the crew the operations to be carried out.

In case of loss of the indicator electrical supply, the overspeed switch remains in the switch closed position.
(5)N1 limit, N1 actual comparison
This comparison is provided by an electronic switch inside the indicator. When N1 actual reaches the indication of the N1 limit bug, the comparison switch opens, thus enabling an overspeed signal to be transmitted to the



N1 Speed Sensor (Pre SB GE 72-298)
Figure 001



1. N1 COMMAND POINTER (BLACK AND WHITE)

   DISPLAYS THE OPTIMUM N1 ACCORDING TO THE THROTTLE SETTING AND FLIGHT CONDITIONS. IN NORMAL STEADY STATE CONDITIONS COINCIDES WITH N1 ACTUAL POINTER.

   IF THE INDICATOR IS NOT POWERED, THE POINTER SHOWS THE LAST POSITION.

   IN THE CASE OF A COMMAND SIGNAL FAILURE THE POINTER SHOWS THE LOWEST VALUE.

2 INDEX

   INDICATES N1 LIMIT.

   IN MANUAL MODE, SET BY ROTATING THE KNOB.

   IN AUTOMATIC MODE, IT IS CONTROLLED BY THE TCC (REF. CH. 22-30), AND INDICATES N1 LIMIT AS A FUNCTION OF THE MODE SELECTED ON THE TRP, FLIGHT CONDITIONS AND AIR BLEED CONFIGURATION.

3. N1 ACTUAL COUNTER

   INDICATES ACTUAL N1 IN DIGITAL FORM

   IF INDICATOR IS NOT POWERED, THE COUNTER IS BLACK

   IN THE CASE OF A SIGNAL FAILURE, THE COUNTER DISPLAYS - - - -

   DURING DIGITAL DISPLAY TEST THE COUNTER WILL SHOW 8888 FLASHING

4. KNOB

   USED TO SELECT MANUAL OR AUTOMATIC N1 LIMIT CALCULATION MODE.

   PULLED OUT :

   - MANUAL MODE SELECTED
   - UPPER DIGITAL COUNTER APPEARS

   ROTATING KNOB MOVES INDEX, AND UPPER DIGITAL COUNTER INDICATES CORRESPONDING VALUE (N1 LIMIT CALCULATED FROM CURVES IN THE FLIGHT MANUAL).

   PUSHED IN :

   - AUTOMATIC MODE SELECTED
   - UPPER DIGITAL COUNTER BLANKED

   INDEX IS CONTROLLED BY THE TCC (REF. CH. 22-30).

5. N1 ACTUAL POINTER (WHITE)

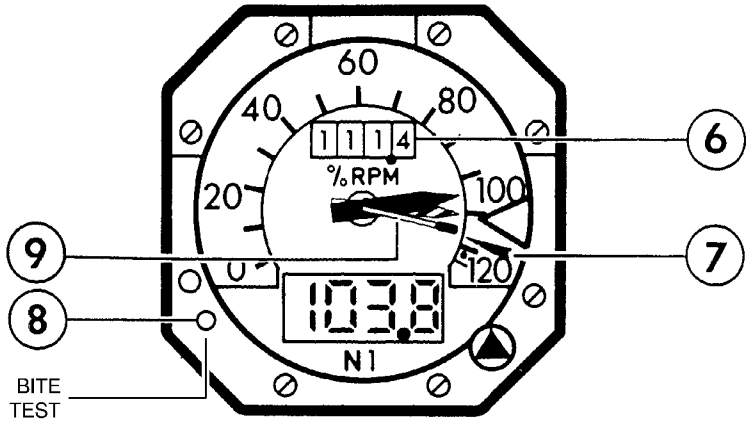
   INDICATES ACTUAL N1 ON THE ANALOG SCALE (0 - 125 %)

   IF THE INDICATOR IS NOT POWERED, OR THE CASE OF A SIGNAL FAILURE, THE POINTER SHOWS THE LOWEST VALUE.

BM5 77 11 00 0 LCM0 01

R

N1 RPM Indicator
Figure 002



6. UPPER DIGITAL COUNTER

INDICATES N1 LIMIT (IN MANUAL MODE ONLY)

KNOB PULLED OUT :

– MANUAL MODE SELECTED

INDICATES IN DIGITAL FORM THE SETTING OF THE INDEX

KNOB PUSHED IN :

– AUTOMATIC MODE SELECTED

COUNTER COVERED BY MASK

7. RED LINE

INDICATES THE MAXIMUM PERMISSIBLE OPERATING SPEED (117.5 % RPM).
WHEN THE POINTER EXCEEDS THIS VALUE, AN INTERNAL SWITCH WILL CAUSE :

– MASTER CAUTION LIGHT TO APPEAR ACCOMPANIED BY THE SINGLE CHIME
– THE ENGINE PAGE TO APPEAR ON THE R ECAM DISPLAY UNIT.
– THE ASSOCIATED INFORMATION TO APPEAR ON THE L ECAM DISPLAY UNIT.

8. BITE TEST

USED TO TEST INDICATOR OPERATION

WHEN PUSHED N1 ACTUAL POINTER, N1 ACTUAL COUNTER
N1 COMMAND POINTER, AND INDEX SHOW 121,4% (BLUE DOT ON THE ANALOG SCALE) IF THE INDICATOR IS OPERATIONAL

9. OVERSPEED POINTER

NORMALLY IN FRONT OF THE RED LINE.

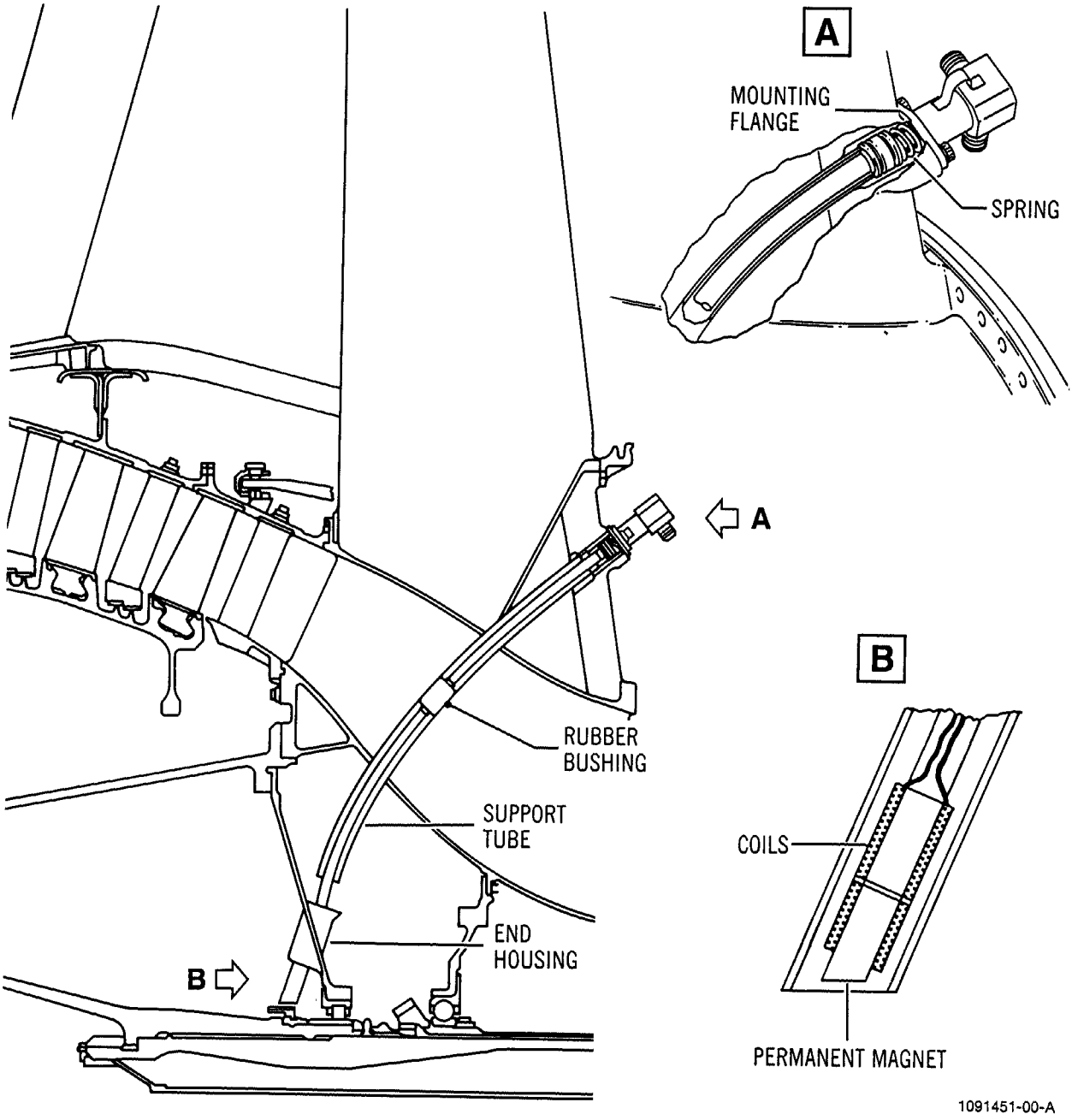
IN THE CASE OF AN OVERSPEED, IT WILL INDICATE THE MAXIMUM VALUE OBTAINED.

IT IS RESET BY PRESSING MAX POINTER RESET PUSHBUTTON.

BM5 77 11 00 0 LEM0 01

N1 RPM Indicator
Figure 003

R



BM5 77 11 00 0 LBMO - 02

N1 Speed Sensor (Post SB GE 72-298)
Figure 004

autothrottle (in manual mode only).
If there is a loss of the indicator power supply, the switch remains closed (N1 actual <N1 limit).

R (6)The test function by means of a bite test the body of which is flush with the dial, and which is located on the left lower part of the indicator.

R This bite test can be activated using a rod type tool.

(7)The test function of the static display which can be automatic by pressing AUTO TEST pushbutton switch on the overhead panel 436VU for at least 0.5 sec., or manual, in case of failure of the automatic system, by placing ANN LT switch in TEST position.
When the static display is supplied, the test sequence will be as follows:
- all the digits disappear (black) for < 1 sec.
- all the "8" appear for less than 1 sec.
- return to the initial configuration if there is no test order.
If at the end of the sequence, the test order is still there, a second sequence is initiated.

INTENTIONALLY BLANK

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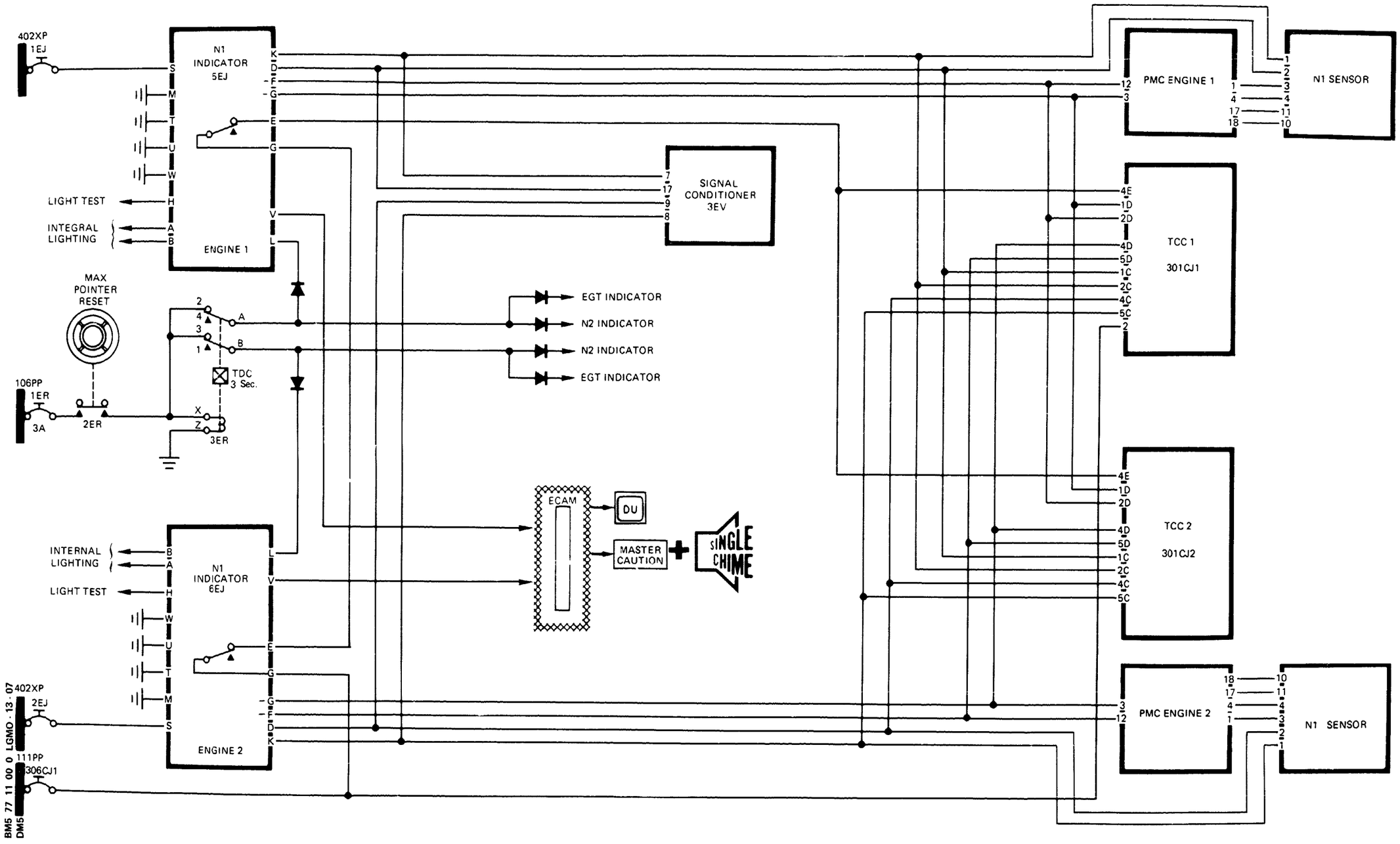


N1 RPM Indication - Electrical circuit
Figure 005

N1 SPEED SENSOR - REMOVAL/INSTALLATION

1. General

The following procedures are to be used when performing maintenance on the N1 speed sensor. Maintenance of the sensor is limited to cleaning threads and pins of the electrical connector. Replace defective sensor.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Access Platform
C.	Corrosion Resistant Steel Lockwire
D.	Protective Cap
E. Material No.C02-006	Anti-Seize Compounds, Lubricants, Oils (Ref. 70-00-00)
F.	Torque Wrench 55-70 lbf.in. (0.6-0.8 m.daN)
Referenced Procedures	
- 71-13-00, P. Block 301	Cowl Doors
- 71-00-00, P. Block 501	Power Plant - General

3. Procedure

A. Job Set-Up

(1)Open, safety and tag the following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
22VU	N1/ENG 1	1EJ	207/C15
22VU	N1/ENG 2	2EJ	207/C16

(2)Open, safety and tag the appropriate circuit breakers and open fan and thrust reverser cowl doors (Ref. 71-13-00, P. Block 301).

(3)Install access platform.

B. Removal

Pre SB GE 72-298

N1 Speed Sensor (Ref. Fig. 401)

End Pre SB GE 72-298

Post B GE 72-298

N1 Speed Sensor (Ref. Fig. 402)

End Post SB GE 72-298

(1)Disconnect electrical lead(s) from connector(s).

(2)Cut and remove lockwire from the 2 mounting bolts and remove bolts.

(3)Carefully remove sensor from its port in fan frame strut No. 3.

(4)Cap electrical connector(s).

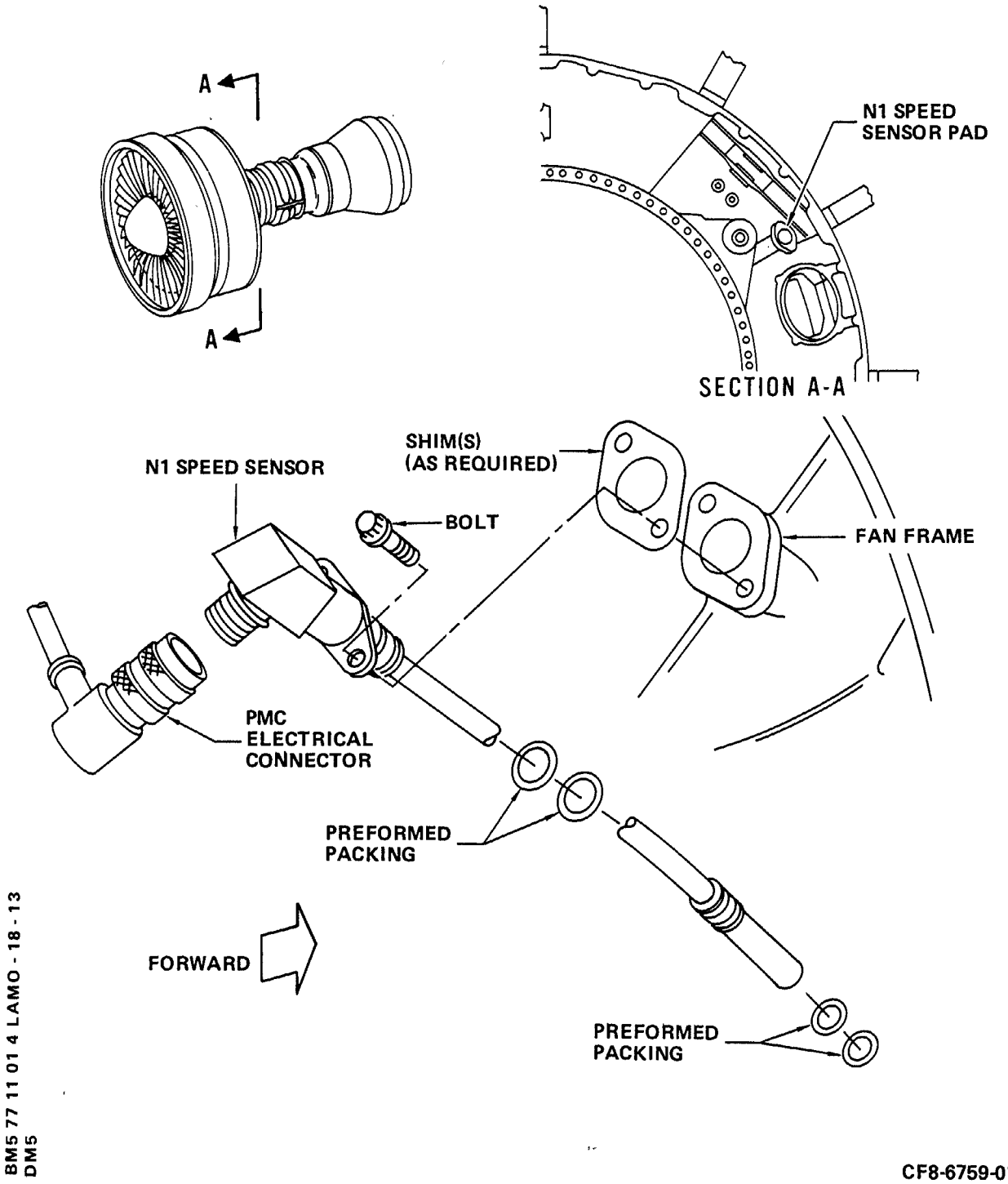
(5)Remove and discard preformed packing(s).

C. Installation

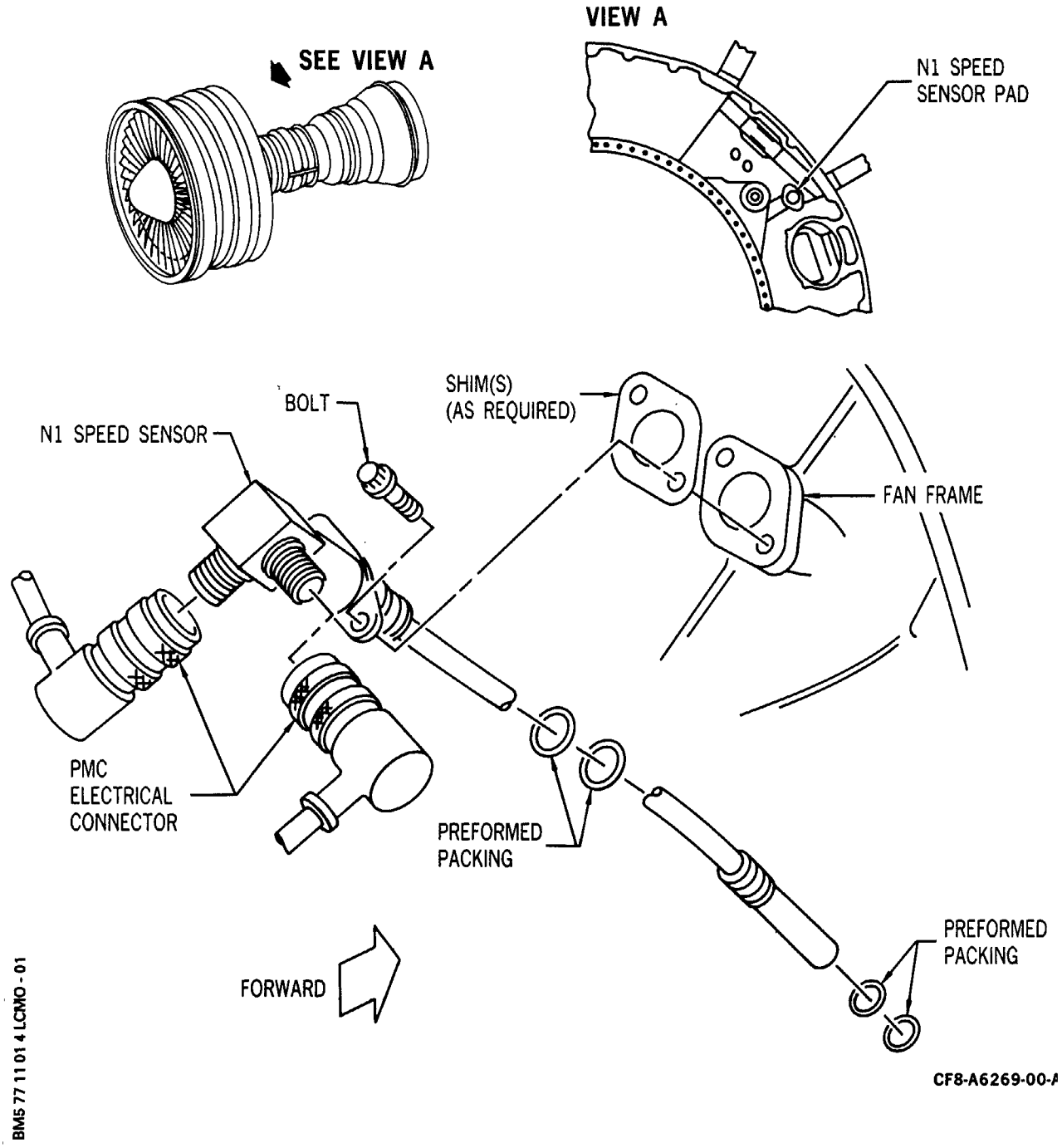
Pre SB GE 72-298
(Ref. Fig. 401)
End Pre SB GE 72-298
Pre SB GE 72-298
(Ref. Fig. 402)
End Pre SB GE 72-298

(1)Make sure the zero load height of the N1 sensor spring is correct (Ref. Fig. 403)
(a)Measure the distance from the bottom of the N1 sensor spring to the inner face of the N1 sensor mount flange.
(b)Look for a zero load height indication of 0.185-0.400 in. (4.70-10.16 mm).
(c)Add shims, if necessary, to the inner face of the N1 sensor mount flange to get the correct zero load indication.
(2)Coat four new preformed packings with lubricant (C02-006) and install in grooves on sensor lead.
(3)Remove protective cap(s) from electrical connector(s).
(4)Carefully insert sensor into its port in fan frame strut No. 3.
(5)Lightly coat threads of bolts with lubricant (C02-006) and install. TORQUE bolts to between 55 and 70 lbf. in. (0.6 and 0.8 m. daN).
(6)Connect electrical connector(s) and hand tighten plus 1/8 turn with soft jawed pliers.

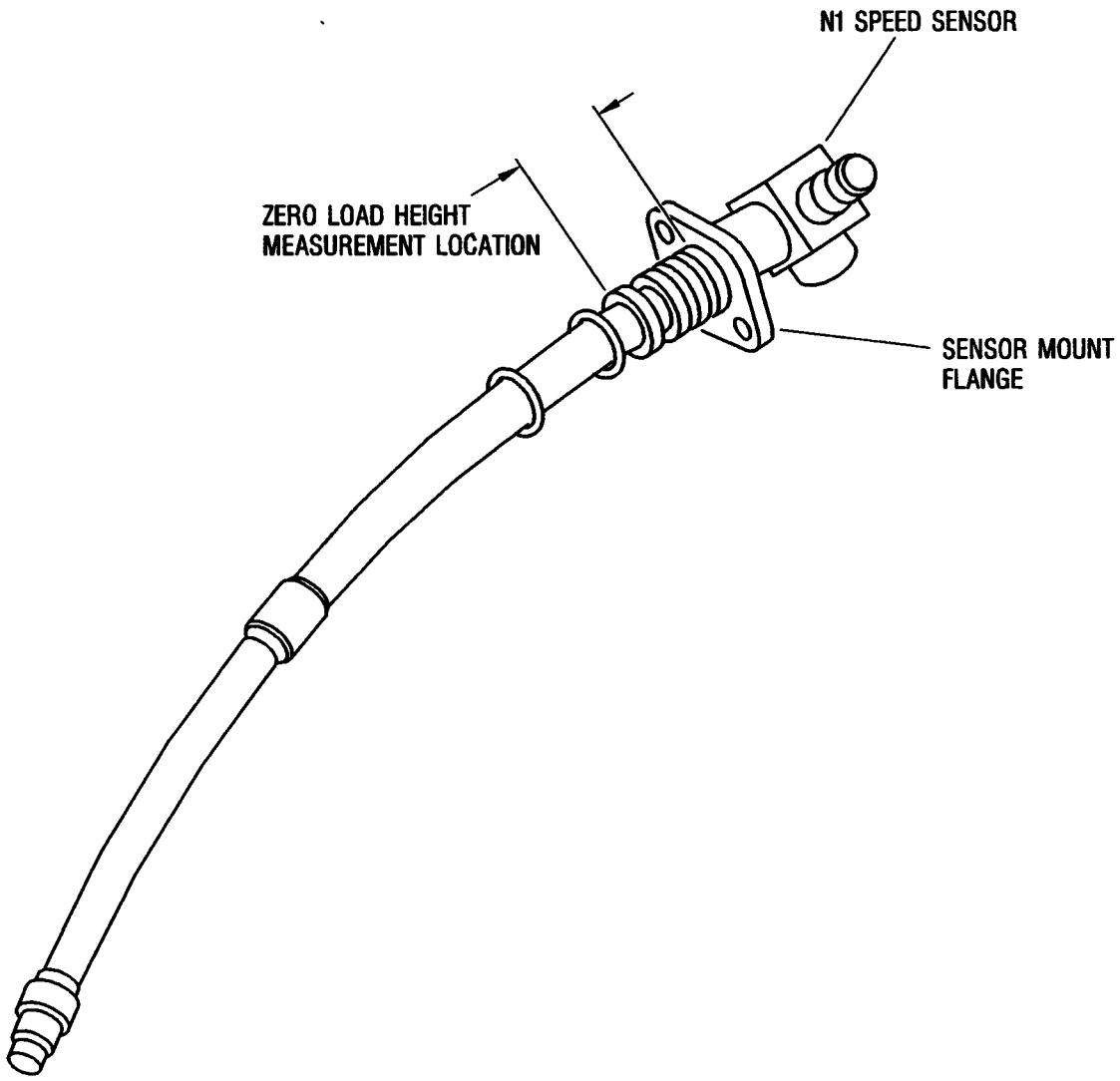
D. Close-Up and Test
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Remove access platform.
(3)Close thrust reverser and fan cowl doors (Ref. 71-13-00, P. Block 301). Remove safety clips and tags and close related circuit breakers together with circuit breakers 1EJ and 2EJ.
(4)Perform test as indicated in "Type of testing after engine component
R replacement" (Ref. 71-00-00, P. Block 501), and, in addition, verify
R that engine vibration level is within limits.



N1 Speed Sensor (Pre SB 72-298)
Figure 401



N1 Speed Sensor (Post SB 72-298)
Figure 402



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1124587-00-1

N1 Speed Sensor
Figure 403

N1 SPEED SENSOR - INSPECTION/CHECK

1. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Access Platform
C. Material No.C04-002	Cleaning Compounds and Solvents (Ref. 70-00-00)
Referenced Procedures	
- 71-13-00, P. Block 301	Cowl Doors
- 71-00-00, P. Block 501	Power Plant - General

2. Procedure

A. Job Set-Up

(1)Open, safety and tag the following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
22VU	N1/ENG 1	1EJ	207/C15
22VU	N1/ENG 2	2EJ	207/C16

(2)Open, safety and tag the appropriate circuit breakers and open fan and thrust reverser cowl doors (Ref. 71-13-00, P. Block 301).

(3)Install access platform.

B. Inspection/Check

WARNING : PERFORM CLEANING OPERATION IN AN APPROVED CLEANING CABINET OR WELL VENTILATED AREA. TAKE PRECAUTIONS TO PREVENT INHALATION OF VAPORS AND TO MINIMIZE FIRE HAZARDS. REPEATED OR PROLONGED CONTACT OF THIS CLEANING MATERIAL WITH THE SKIN WILL REMOVE SKIN OILS AND MAY CAUSE SEVERE DERMATITIS.

INSPECT/CHECK	MAXIMUM SERVICEABLE LIMITS	REMARKS
(1) Connector for :		
(a) Cracks	None allowed	Replace sensor
(b) Crossed threads	None allowed	Replace sensor
(c) Nicked threads	Any amount not beyond complete depth of thread	Chase threads or replace sensor
(d) Bent pins	None allowed	Replace sensor
(e) Dirt in connector	None allowed	Clean with soft bristle brush and solvent (C04-002)

C. Close-Up

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2)Remove access platform.
(3)Close cowl doors (Ref. 71-13-00, P. Block 301). Remove safety clips and tags and close circuit breakers 1EJ and 2EJ.

D. Test
(1)Perform engine dry motoring procedure (Ref. 71-00-00, P. Block 501) and check that N1 indication is correct.

N1 RPM INDICATOR - REMOVAL/INSTALLATION

NOTE : Removal/Installation procedures for N1 RPM indicators on L and R engines are identical.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Blanking Caps/Plugs
Referenced Procedure	
- 24-41-00, P. Block 301	AC External Power Control
R - 22-30-00, P. Block 501	Autothrottle

2. Procedure

A. Job Set-Up
(1)Open, safety and tag the following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
22VU	ENGINES/N1 ENG1	1EJ	207/C15
22VU	ENGINES/N1 ENG2	2EJ	207/C16
133VU	ENGINES/ENG1 & 2 IND MAX POINTER RESET	1ER	332/U71

B. Removal
(Ref. Fig. 401)
(1)On face of panel 4VU, remove two screws (1) attaching N1 RPM indicator.
(2)Remove N1 RPM indicator (3) from panel 4VU.
(3)Disconnect N1 RPM indicator and blank off plug and receptacle (2).

C. Installation
(1)Check housing of N1 RPM indicator on panel 4VU.
(2)Remove blanking caps from plug and receptacle (2) and connect plug.
(3)Install N1 RPM indicator (3) in panel 4VU.
(4)Attach N1 RPM indicator (3) to panel 4VU with two screws (1).
(5)Remove safety clips and tags and close circuit breakers 1EJ, 2EJ and 1ER.

D. Test
(1)Connect electrical ground power unit (Ref. 24-41-00, P. Block 301).
(2)Make certain that electrical supply is correct (115VAC, 28VDC, 26VAC).

ACTION	RESULT
(1)On panel 4VU - maintain slot of BITE screw R or Press-To-Test button, located in L lower section of N1 RPM indicator 5EJ (6EJ), in S R position or pressed in,	On N1 RPM indicator 5EJ (6EJ) - the main and maximum pointer indicates 121.4 %. ± 1 % (the main and maximum pointer aligns with the blue mark). - the digital counter indicates

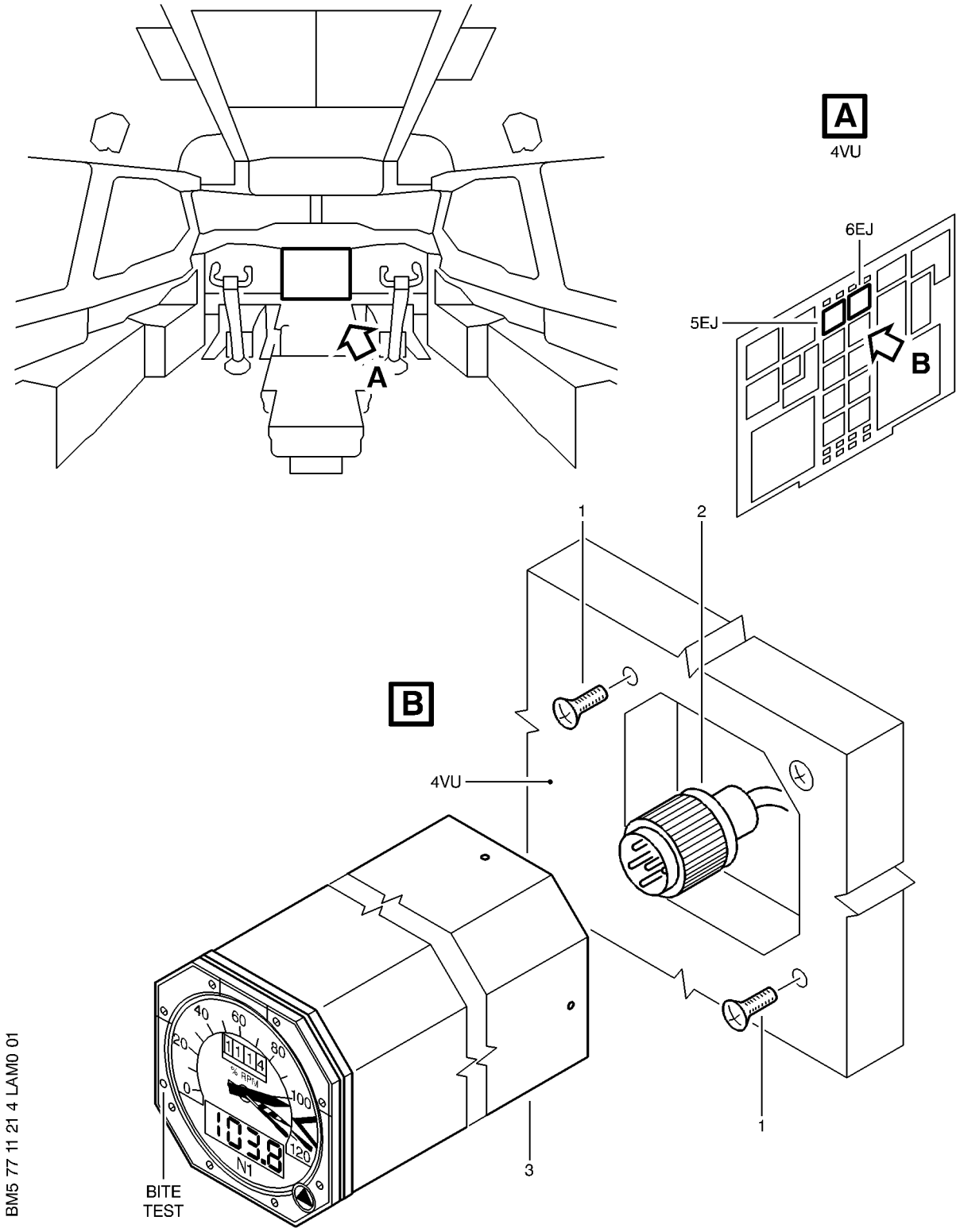
	ACTION	RESULT
R	respectively.	121.4 % ± 0.2 %.
	- release BITE screw from S	- the main pointer returns to 0
R	position or release	percent position.
R	Press-To-Test button.	- the maximum indicating pointer remains in front of the blue mark. remains in front of the blue mark.
	(2)On panel 472VU	On panel 4VU, N1 RPM indicator 5EJ (6EJ)
	- press ENG/MAX POINTER RESET pushbutton switch	- the maximum indicating pointer returns in front of the red mark.
R	(3)Perform N1 limit computation test (Ref. 22-30-00, P. Block 501).	

E. Close-Up

(1)De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, P. Block 301).

(2)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(3)Restore aircraft systems to normal operating condition.



N1 RPM Indicator
Figure 401

R

N2 RPM INDICATING SYSTEM - DESCRIPTION AND OPERATION

1. General

The measurement channel for the HP rotor speed (N2) is composed of :
- a speed sensor
- an indicator

for each engine.

2. N2 Speed Sensor (Ref. Fig. 001)

The HP rotor speed signal is provided by the coil of the engine PMC alternator (the PMC alternator is driven by the accessory gearbox).
This signal is transmitted in analog form to the indicator, the vibration signal conditioner and the PMUX (Ref. 77-31).

3. N2 RPM Indicator

(Ref. Fig. 002)
(Ref. Fig. 003)
The N2 RPM indicator is located on the center instrument panel (4VU).

A. Description

The N2 RPM indicator provides :

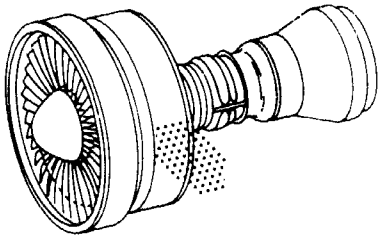
(1) The N2 analog display by means of a pointer which deflects in front of a dial graduated from 0 to 120%. The pointer is deviated by the analog signal coming from the N2 sensor.

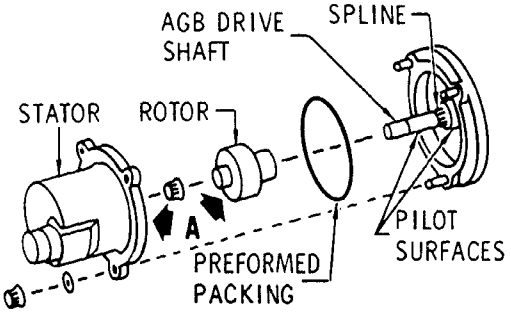
(2) The N2 digital display by means of a static display located in the lower part of the indicator (0 to 120%).
The display is operated by the N2 analog signal.
The analog signal is transformed into a digital one inside the indicator.

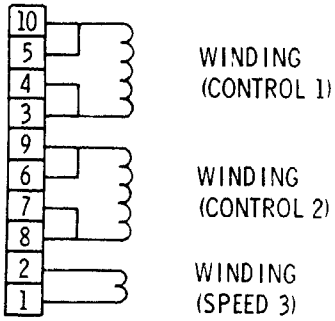
(3) The overspeed indication is given by a very thin pointer (black with red end).
This pointer is driven by the N2 pointer (when the value becomes greater than 112.5% and remains at the maximum value reached (value storage).
An overspeed switch, inside the indicator opens when N2 is greater than 112.5%, thus transmitting a signal towards :
- the amber MASTER CAUTION light accompanied by the single chime
- the R ECAM display unit on which appears the ENGINE page
- the L ECAM display unit, which indicates to the crew the operations to be carried out.

(4) The AIDS function
There is an analog output (0-5 VDC) of the N2 data (as per ARINC 717) towards the DFDAU (Ref. 77-31).

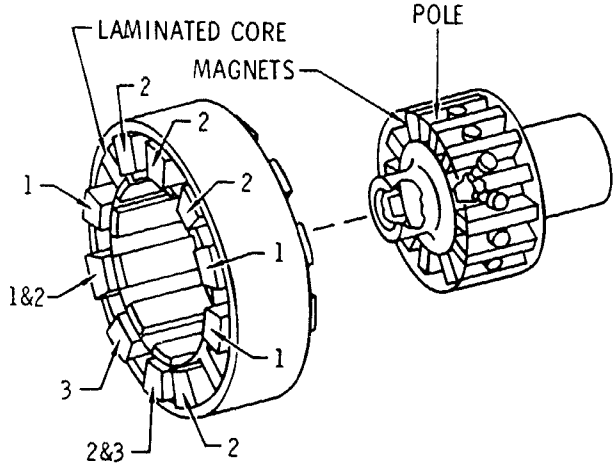
R (5) The test function by means of a bite test the body of which is flush with the dial, and which is located on the LH lower part of the
R indicator. This bite test is activated by a rod type tool.
R Operation of this bite test has for effect :
- to deflect the pointers (N2, overspeed), up to the blue dot on the graduation (N2= 117%)
- to have 117% value displayed on the N2 static display.
- to open the overspeed switch (N2 > 112.5%) and thus trigger the warnings described in paragraph (3).
- to transmit a signal equal to 117% to the AIDS output.





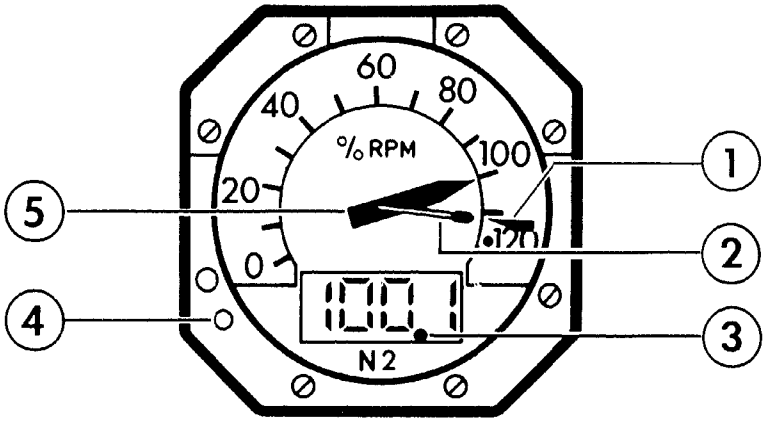


VIEW A



BM5 77 12 00 0 LAMO 13 07
DM5

N2 Speed Sensor
Figure 001



1 - RED LINE

INDICATES THE MAXIMUM PERMISSIBLE OPERATING SPEED (112.5%)

WHEN THE POINTER EXCEEDS THIS VALUE, AN INTERNAL SWITCH WILL CAUSE:

- AMBER MASTER CAUTION LIGHT TO COME ON ACCOMPANIED BY THE SINGLE CHIME
- THE ENGINE PAGE TO APPEAR ON THE R ECAM DISPLAY UNIT
- THE ASSOCIATED INFORMATION TO APPEAR ON THE L ECAM DISPLAY UNIT

2 - OVERSPEED POINTER

NORMALLY IN FRONT OF THE RED LINE

IN THE CASE OF AN OVERSPEED IT WILL INDICATE THE MAXIMUM VALUE OBTAINED.

IT IS RESET BY PRESSING MAX POINTER RESET PUSHBUTTON.

3 - DIGITAL COUNTER

INDICATES N2 SPEED IN DIGITAL FORM

IF THE INSTRUMENT IS NOT POWERED THE COUNTER IS BLACK

IN THE CASE OF A SIGNAL FAILURE, THE COUNTER DISPLAYS _ _ _ _

DURING LIGHT TEST, THE COUNTER WILL SHOW 8888 FLASHING

4 - BITE TEST

USED TO TEST INDICATOR OPERATION

WHEN PUSHED, THE POINTER, DIGITAL COUNTER AND OVERSPEED POINTER INDICATE 117% (BLUE DOT ON AN ANALOG SCALE) AND THE OVERSPEED WARNINGS (REF. RED LINE) OCCUR IF THE INDICATOR IS OPERATIONAL

5 - POINTER

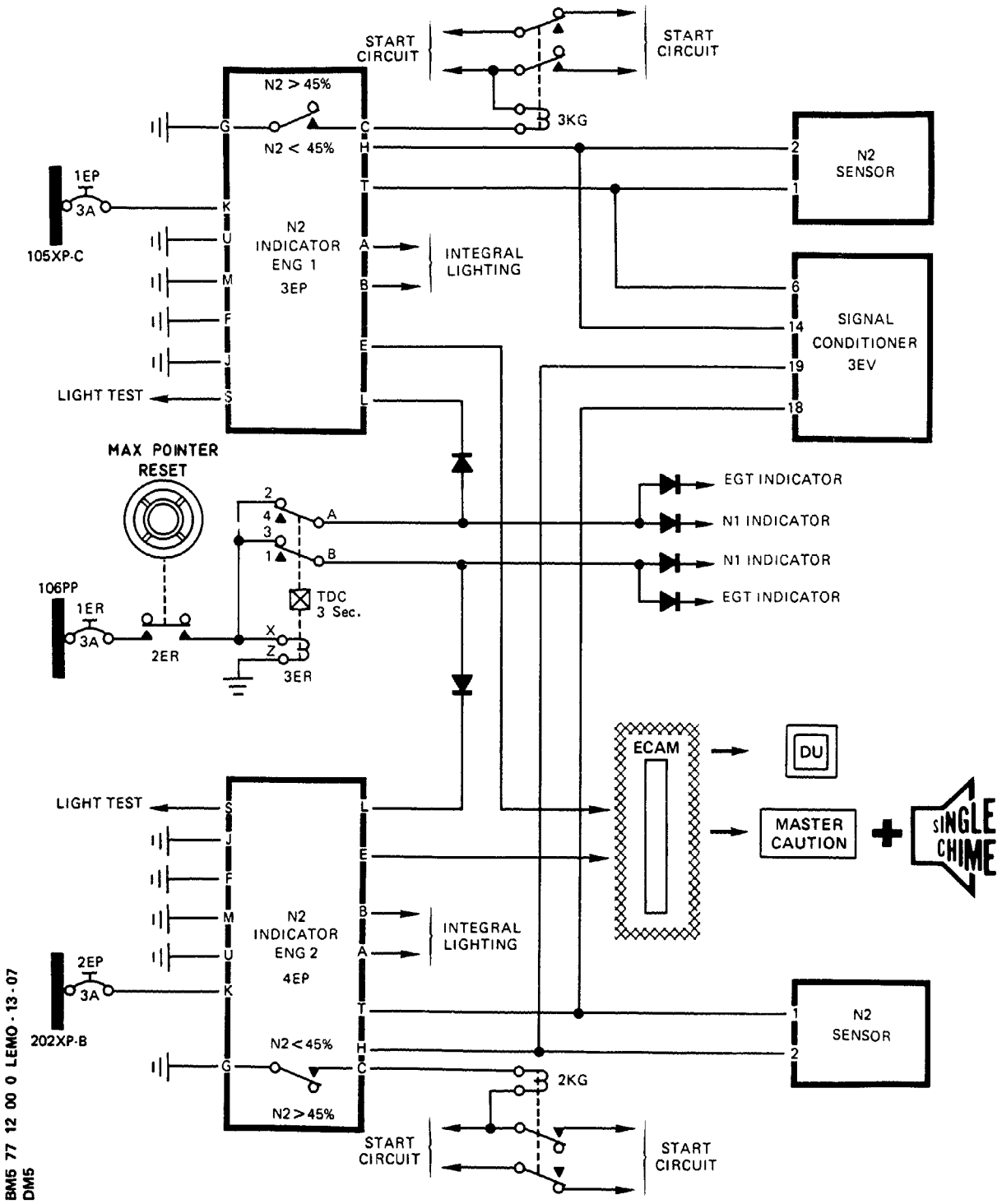
INDICATES N2 SPEED ON THE ANALOG SCALE (0 - 120%)

IF THE INSTRUMENT IS NOT POWERED OR IN THE CASE OF A SIGNAL FAILURE, THE POINTER SHOWS THE LOWEST VALUE (< 0).

BM5 77 12 00 0 LCM0 01

N2 RPM Indicator
Figure 002

R



N2 RPM Indication - Electrical Circuit
Figure 003

R When the bite test is released, all return to standby position, except the overspeed pointer which remains in position (it will return to standby position (112.5%) after activation of **MAX POINTER RESET** pushbutton switch).

(6) Starter cut off

The opening of a switch inside the indicator enables the closure of the start valve when **N2** reaches **45%**.

(7) The test function of the static display

The function is identical to **N1** function described in **77-11-00**.

N2 SPEED SENSOR - REMOVAL/INSTALLATION

1. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Cap
C. Material No.C02-019	Anti-seize Compounds, Lubricants, Oils (Ref. 70-00-00)
D.	Torque Wrench 100-180 lbf.in (1.13-2.03 m.daN)
Referenced Procedures	
- 71-13-00, P. Block 301	Cowl Doors
- 71-00-00, P. Block 501	Power Plant - General

2. Procedure

A. Job Set-Up

(1)Open, safety and tag the following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
133VU	ENG 1/N2	1EP	334/S70
133VU	ENG 2/N2	2EP	334/S73

(2)Open, safety and tag the appropriate circuit breakers and open fan cowl doors (Ref. 71-13-00, P. Block 301).
Pre GE SB 77-004 *** (CONTROL ALTERNATOR WITH REAR FLANGE TO ACCOMMODATE A CORE-TURNING GEAR MOTOR)

B. Removal (Ref. Fig. 401)

(1)Disconnect electrical plug from stator housing connector.
(2)Place protective cap on connector.
(3)Remove the 3 bolts and washers which secure the stator to the accessory gearbox.
(4)Remove stator from gearbox pad.
(5)Remove and discard preformed packing.
(6)Remove nut which secures rotor to gearbox shaft.
(7)Remove alternator rotor by sliding it off the shaft.

C. Installation (Ref. Fig. 401)

(1)Slide alternator rotor onto gearbox shaft, engaging the splines. Make sure longer end of rotor faces gearbox.
(2)Secure rotor to shaft with nut. TORQUE nut to between 150 and 180 lbf.in. (1.7 and 2.0 m.daN).
(3)Lightly coat preformed packing with engine oil (C02-019) and install onto pilot diameter of stator housing.
(4)Install stator housing on gearbox pad.
NOTE : Use care when installing housing to prevent damage to preformed packing.
(5)Install bolts and washers. TORQUE bolts to between 100 and 130 lbf.in.

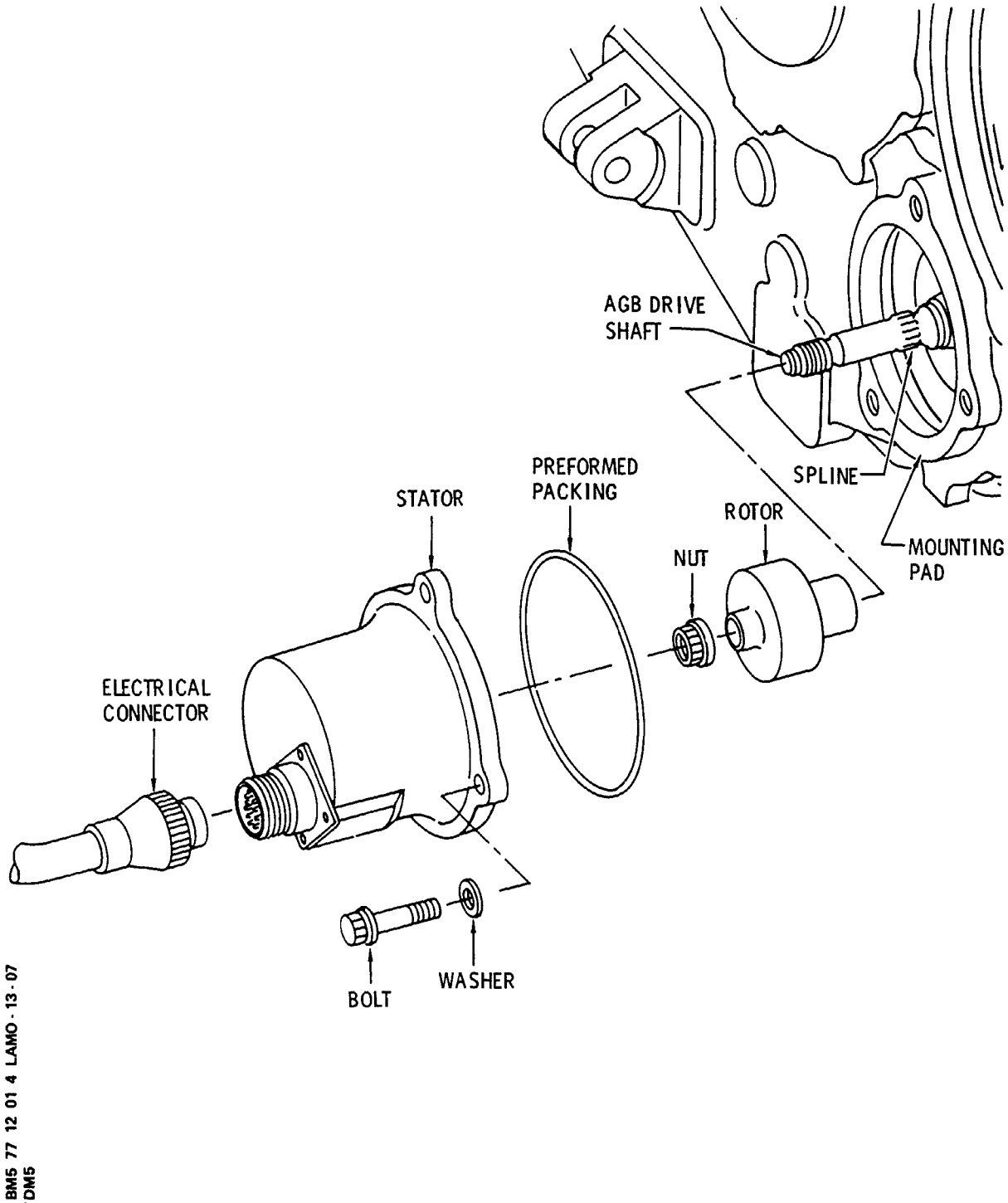
(1.13. and 1.47 m.daN).
(6)Connect electrical connector and hand tighten.
End Pre GE SB 77-004
GE SB 77-004 *** (CONTROL ALTERNATOR WITH REAR FLANGE TO ACCOMMODATE A CORE-TURNING GEAR MOTOR)

D. Removal (Ref. Fig. 402)
(1)Disconnect electrical connector from stator housing.
(2)Remove 3 bolts and 3 washers securing the stator housing to the accessory gearbox.
(3)Remove stator from accessory gearbox.
(4)Remove preformed packing from stator housing and discard.
(5)Remove nut securing rotor to gearbox splined shaft.
(6)Remove rotor by sliding it off the gearbox splined shaft.

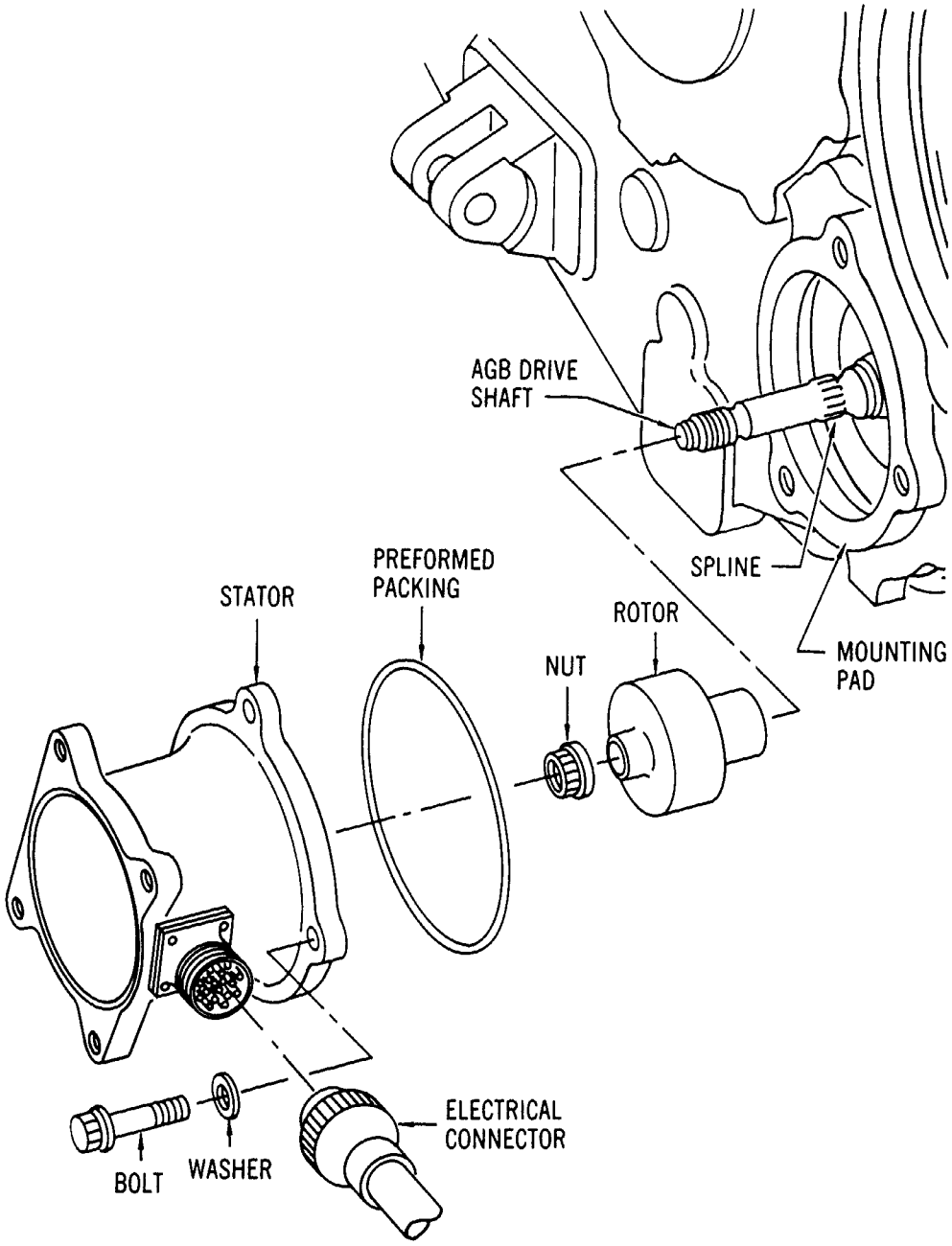
E. Installation (Ref. Fig. 402)
(1)Slide rotor onto the gearbox shaft engaging the splines.
(2)Secure rotor to shaft with nut. TORQUE nut to between 150 and 180 lbf.in. (1.69 and 2.03 m.daN).
(3)Lightly coat preformed packing with engine oil (C02 - 019) and install onto pilot diameter of stator housing.
(4)Install stator housing onto accessory gearbox pad.
NOTE : Use care when installing housing to prevent damage to performed packing.
(5)Secure stator housing to accessory gearbox pad with bolts and washers. TORQUE bolts to between 100 and 130 lbf.in. (1.12 and 1.46 m.daN).
(6)Connect electrical connector to stator housing and hand tighten.
End GE SB 77-004

F. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close fan and thrust reverser cowl doors. Remove safety clips and tags and close related circuit breakers (Ref. 71-13-00, P. Block 301) together with circuit breakers 1EP and 2EP.

G. Test
R (1)Perform test as indicated in "Type of testing after engine component
R replacement" (Ref. 71-00-00, P. Block 501), and, in addition, verify that
R engine vibration level is within limits.



N2 Speed Sensor (pre GE SB 77-004)
Figure 401



BM5 77 12 01 4 LCMO - 23 - 18
DM5

CF8–A6144–00–A

N2 Speed Sensor (GE SB 77-004)
Figure 402

N2 SPEED SENSOR - INSPECTION/CHECK

1. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B. Material No.C04-002	Cleaning Compounds and Solvents (Ref. 70-00-00)
C.	Megger, 500 VDC
Referenced Procedures	
- 71-13-00, P. Block 301	Cowl Doors
- 77-12-01, P. Block 401	N2 Speed Sensor

2. Procedure

A. Job Set-Up

(1)Open safety and tag the appropriate circuit breakers and open fan cowl doors (Ref. 71-13-00, P. Block 301).

(2)Open safety and tag the following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
133VU	ENG 1/N2	1EP	333/T73
133VU	ENG 2/N2	2EP	333/T74

(3)Remove N2 speed sensor (Ref. 77-12-01, P. Block 401).

B. Visual Inspection/Check

INSPECT/CHECK	MAXIMUM SERVICEABLE LIMITS	REMARKS
(1)Stator Housing for :		
(a)Cracks	Not Serviceable	Replace stator housing
(b)Deformation, dents	Not Serviceable	Replace stator housing
(c)Nicks, scratches	Any amount and size not through housing wall	Replace stator housing
(d)Heat discoloration	Not serviceable	Replace stator housing
(2)Electrical connector for :		
(a)Thread damage	30 % on one entrance thread or 10 % damage on each of two entrance threads	Chase thread if within limits or replace housing
(b)Bent pins	Not serviceable	Replace stator housing
(c)Internal arcing	Not serviceable	Replace stator housing

WARNING : SOLVENTS ARE TOXIC AND FLAMMABLE. PERFORM THIS OPERATION IN A WELL VENTILATED AREA. TAKE PRECAUTIONS TO PREVENT BREATHING OF VAPORS AND TO MINIMIZE FIRE HAZARD. REPEATED OR PROLONGED CONTACT OF THIS CLEANING MATERIAL WILL REMOVE SKIN OILS AND MAY CAUSE SEVERE DERMATITIS.

INSPECT/CHECK	MAXIMUM SERVICEABLE LIMITS	REMARKS
(d)Internal dirt	Any amount	Clean with a soft bristle brush and solvent (C04-002)

C. Electrical Inspection/Check
(1)Inspect the following :
(a)Measure insulation resistance between stator windings, and between stator windings and frame.
(b)Resistance shall be 1.0 megohm minimum at 500VDC for one minute.

D. Close-Up
(1)Install N2 speed sensor (Ref. 77-12-01, P. Block 401).
(2)Remove safety clips and tags and close circuit breakers, close fan and thrust reverser cowl doors (Ref. 71-13-00, P. Block 301).

N2 RPM INDICATOR - REMOVAL/INSTALLATION

NOTE : Removal/Installation procedures for N2 RPM indicators on L and R engines are identical.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Blanking Caps/Plugs
Referenced Procedure - 24-41-00, P. Block 301	AC External Power Control

2. Procedure

A. Job Set-Up
(1)Open, safety and tag the following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
133VU	ENGINES/ENG1 N2	1EP	334/S70
133VU	ENGINES/ENG2 N2	2EP	334/S71
133VU	ENGINES/ENG1 & 2 IND MAX POINTER RESET	1ER	332/U72

B. Removal
(Ref. Fig. 401)
(1)On face of panel 4VU, remove two screws (1) attaching N2 RPM indicator.
(2)Remove N2 RPM indicator (3) from panel 4VU.
(3)Disconnect N2 RPM indicator and blank off plug and receptacle (2).

C. Installation
(1)Check housing of N2 RPM indicator on panel 4VU.
(2)Remove blanking caps from plug and receptacle (2) and connect plug.
(3)Install N2 RPM indicator (3) in panel 4VU.
(4)Attach N2 RPM indicator (3) to panel 4VU with two screws (1).
(5)Remove safety clips and tags and close circuit breakers 1EP, 2EP and 1ER.

D. Test
(1)Connect electrical ground power unit (Ref. 24-41-00, P. Block 301).
(2)Make certain that electrical supply is correct (28VDC, 115VAC, 26VAC).

ACTION	RESULT
(1)On panel 4VU - maintain slot of BITE screw R or Press-To-Test button, located in L lower section of N2 RPM indicator 3EP (4EP), in S R position or pressed in, R respectively. - release BITE screw from S	On N2 RPM indicator 3EP (4EP) - the main and maximum pointer indicates 117 % ± 1.0 % (the main and maximum pointer aligns with the blue mark). - the digital counter indicates 117 % ± 0.2 %. - the main pointer returns to 0

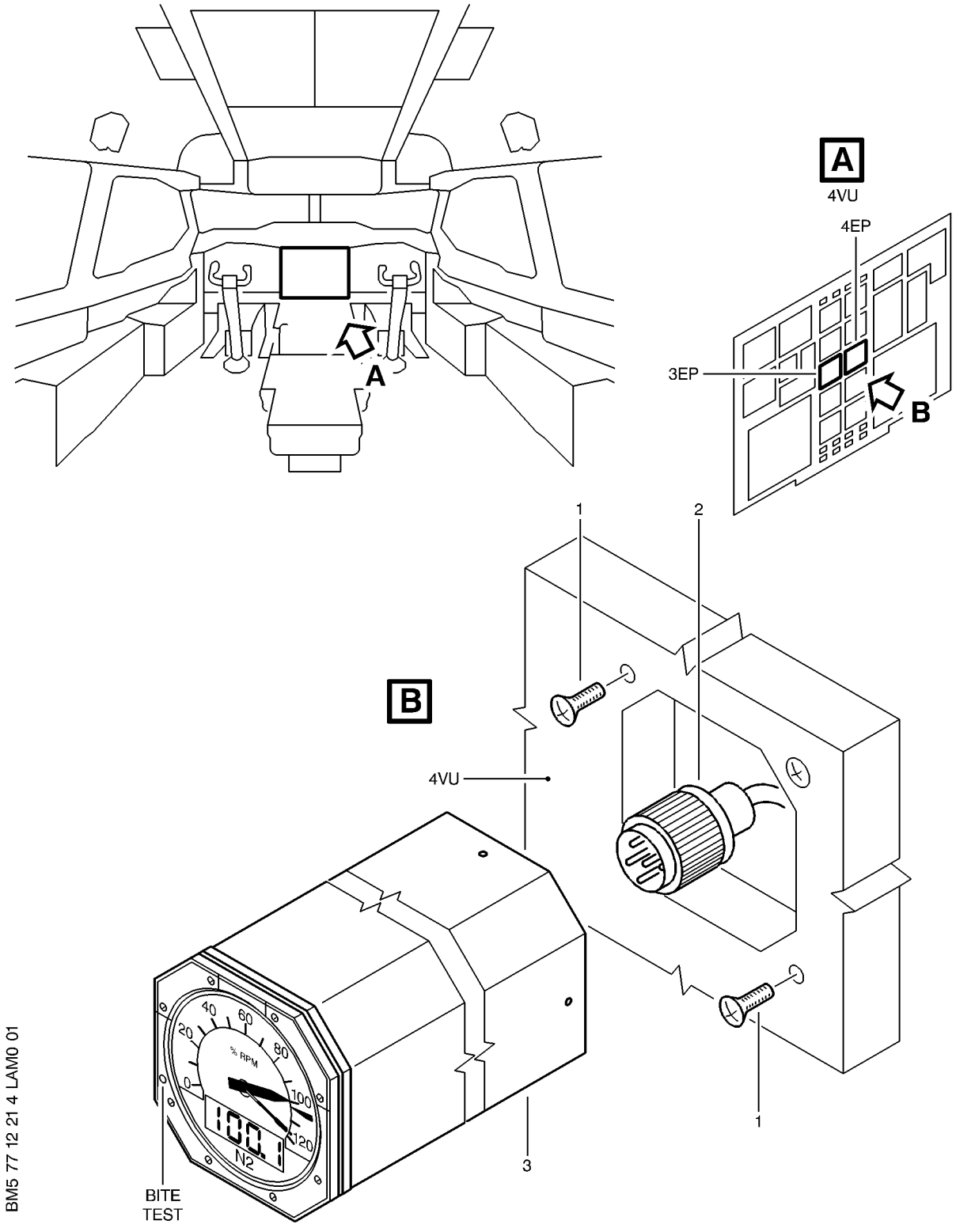
	ACTION	RESULT
R	position or release	percent position.
R	Press-To-Test button.	- the maximum indicating pointer remains in front of the blue mark.
	(2)On panel 472VU, - press ENG/IND MAX POINTER/RESET pushbutton switch	On panel 4VU, N2 RPM indicator 3EP (4EP) - the maximum indicating pointer returns in front of the red mark.

E. Close-Up

(1)De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, P. Block 301).

(2)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(3)Restore aircraft systems to normal operating condition.



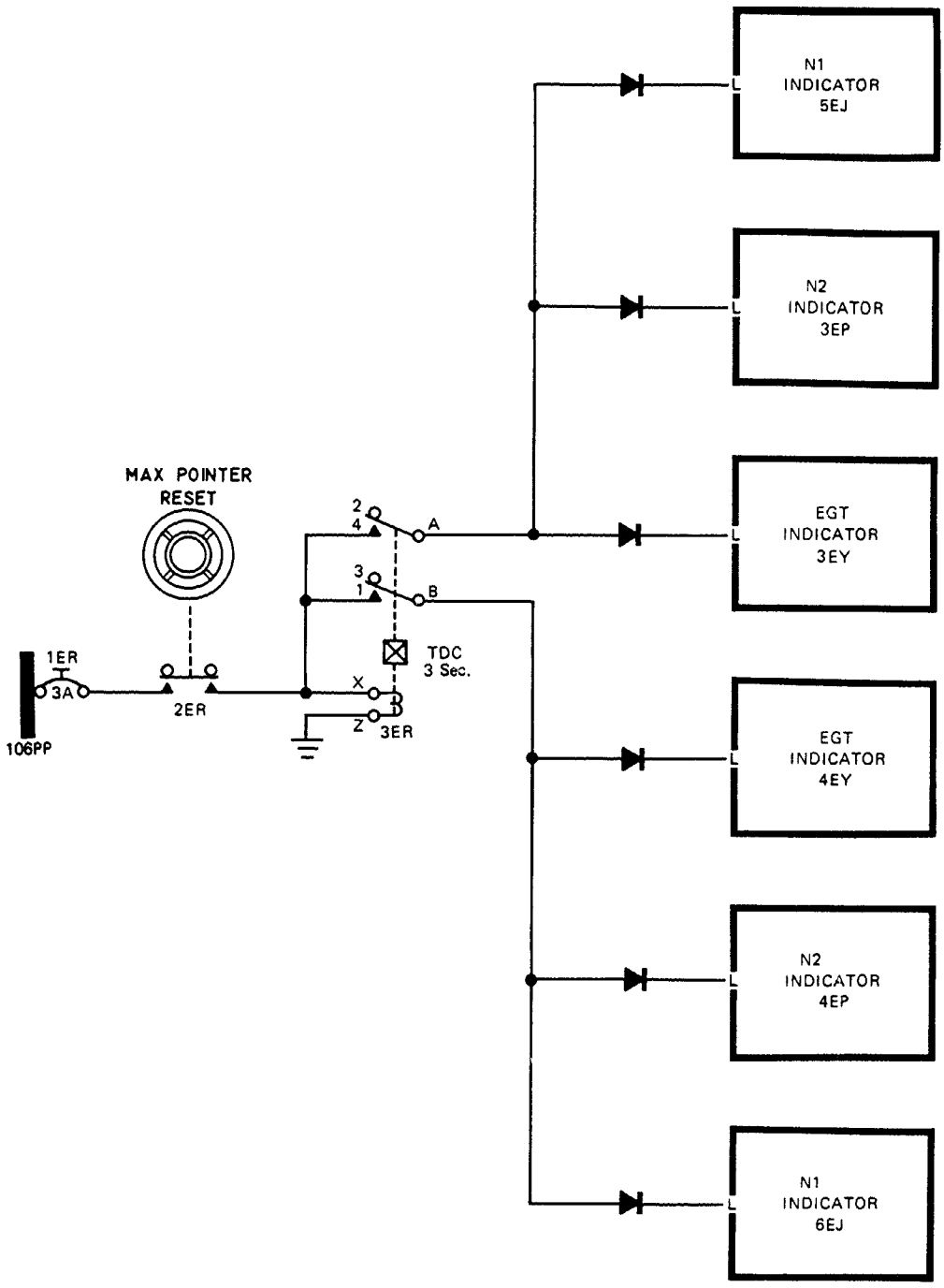
BM5 77 12 21 4 LAM0 01

N2 RPM Indicator
Figure 401

MAXIMUM POINTER RESET - DESCRIPTION AND OPERATION

1 Description (Ref. Fig. 001)

This pushbutton switch enables resetting of all the maximum pointers and is located on lateral panel 472VU. When pressing **MAX POINTER RESET** pushbutton switch, a signal is sent for three seconds to the **N1**, **N2** and **EGT** indicators. This signal enables the return to the initial position of all the maximum pointers (red mark on the indicator dials at **N1** = 117.5 %, **N2** = 112.5 % and **EGT** = 960°). This pushbutton switch is only used after the flight when the flight crew has noted an overspeed.



BM5 77 14 00 0 LAMO 13 07
DM5

Max Pointer Reset - Electrical Circuit
Figure 001

EXHAUST GAS TEMPERATURE INDICATING SYSTEM - DESCRIPTION AND OPERATION

1. General

The measurement channel for the LP turbine inlet temperature comprises :
- a sensing system (a harness of eight chromel/alumel thermocouple probes)
- an indicator

for each engine.

2. EGT Sensing System (Ref. Fig. 001, 002)

It is made up of a harness of eight dual immersion chromel/alumel thermocouple probes distributed in the LP turbine inlet plane (plane 49).
The thermocouples are grouped in two assemblies of four thermocouples each.
The values given by the two groups are averaged in a junction box to produce a continuous voltage signal in the mV range.
This signal is transmitted to the indicator and the PMUX, if applicable (Ref. 77-31).

NOTE : Each pair of thermocouples (4) is accessible, so that a failure of one of them may be revealed when necessary.

3. EGT Indicator

(Ref. Fig. 003)
(Ref. Fig. 004)
The EGT indicator is located in center instrument panel (4VU).
It is supplied with 115VAC 400Hz, through circuit breaker 1EY (2EY).

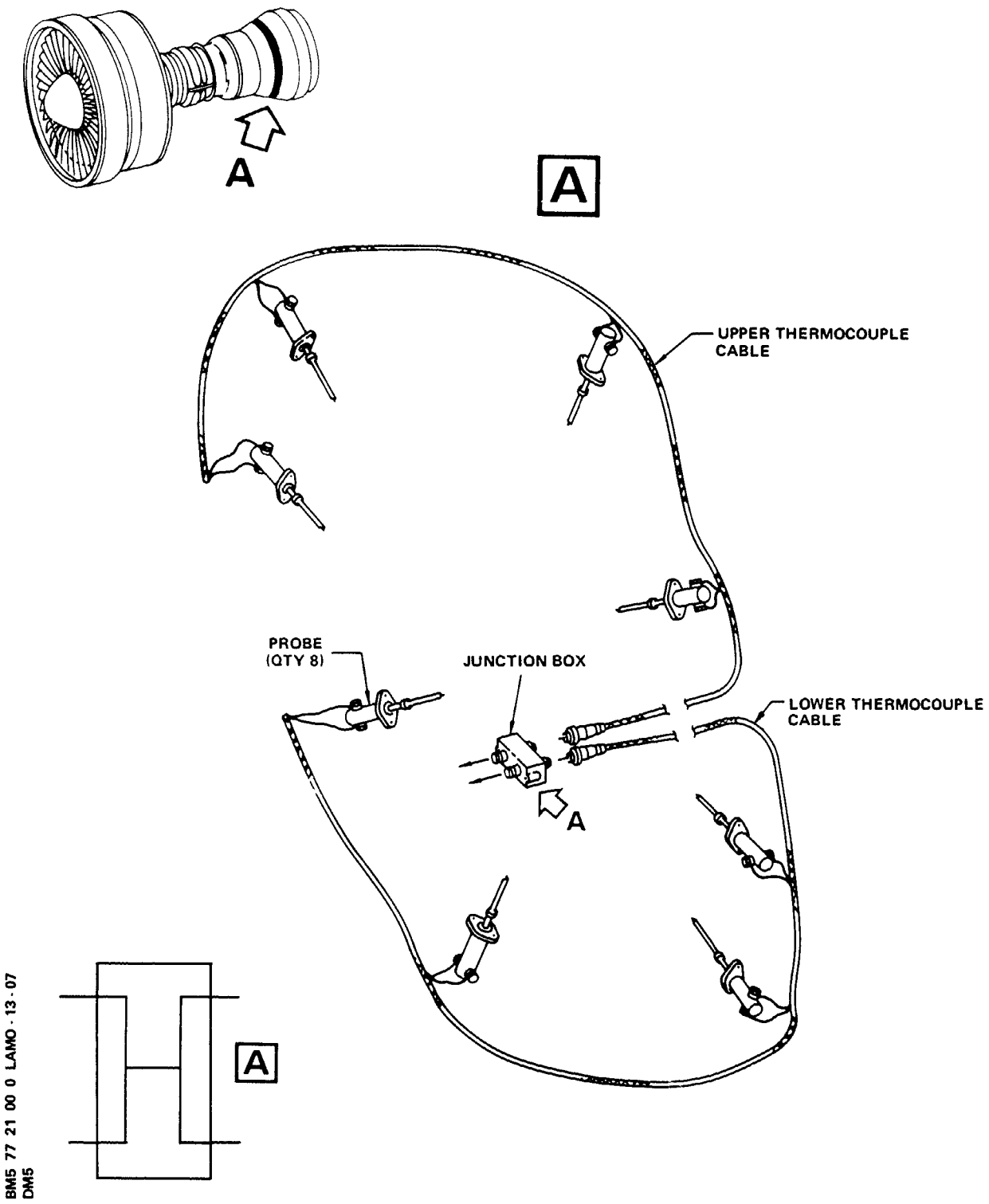
A. Description

The EGT indicator provides :

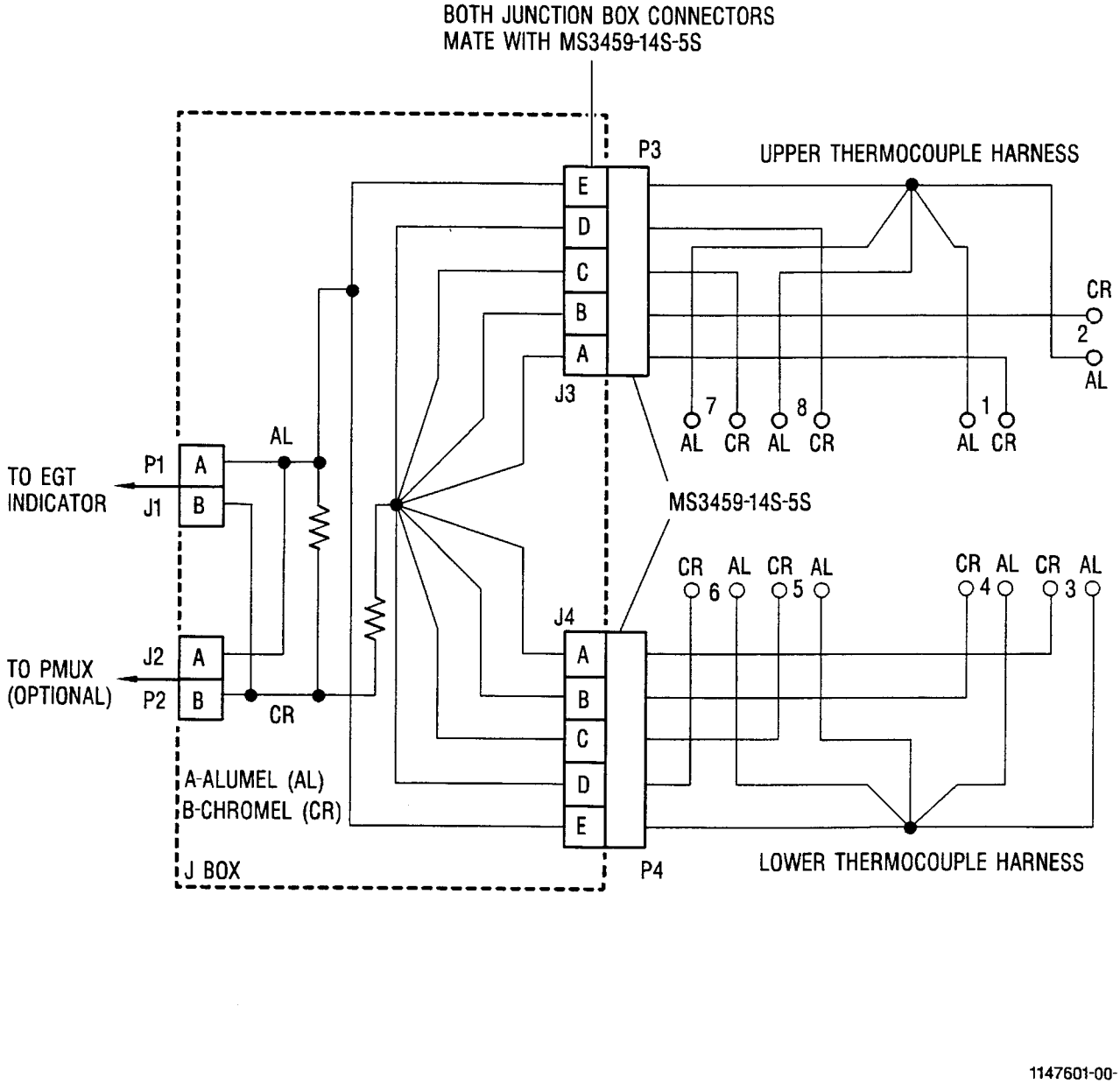
(1) The EGT analog display which is obtained by a pointer deflecting in front of a quadrant graduated from 0 to 1000°C.
The pointer is deviated by the analog signal from the harness of eight chromel/alumel thermocouples.
In cases of failure of the EGT analog data or of loss of the indicator power supply, the pointer deflects down to the low stop under zero, partially masking the digital counter.

(2) The EGT digital display by means of a static display, located in the lower part of the indicator.
The display operation is provided by the EGT analog signal from the thermocouple harness.

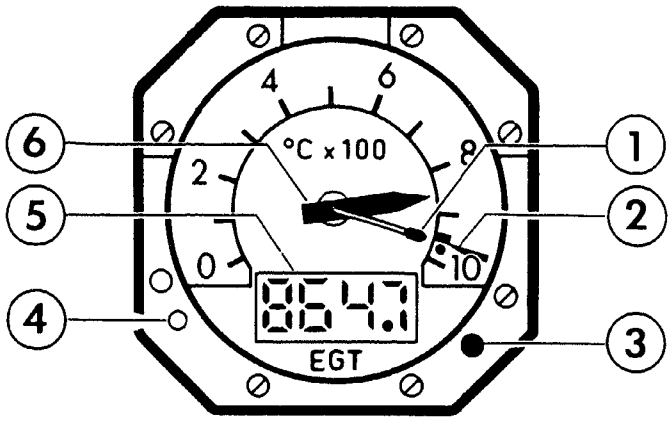
(3) The overtemperature indication by means of a very thin pointer (black with red end), the standby position of which is 960°C (red mark on the graduated dial).
This pointer is driven by the EGT pointer (when the value becomes greater than 960°C and remains at the maximum value reached (value storage).
The overtemperature switch inside the indicator opens when the EGT ≥ 960°C + 0°C - 15°C, thus transmitting a signal to :
- The amber MASTER CAUTION light comes on accompanied by single chime.
- The R ECAM display unit on which appears the ENGINE page.
- the L ECAM display unit, which indicates to the crew the operations



EGT Sensing System
Figure 001



EGT System Schematic (Semi-Flexible)
Figure 002



1. OVERTEMPERATURE POINTER

   NORMALLY IN FRONT OF THE RED LINE. IN THE CASE OF AN OVERTEMPERATURE, IT WILL INDICATE THE MAXIMUM EGT OBTAINED.

   IT IS RESET BY PRESSING MAX, POINTER RESET PUSHBUTTON

2. RED LINE

   INDICATES THE MAXIMUM PERMISSIBLE EGT OPERATING TEMPERATURE (960°)

   WHEN THE POINTER EXCEEDS THE VALUE AN INTERNAL SWITCH WILL CAUSE :

   - AMBER MASTER CAUTION LIGHT TO COME ON ACCOMPANIED BY THE SINGLE CHIME.
   - THE ENGINE PAGE TO APPEAR ON THE R ECAM DISPLAY UNIT
   - THE ASSOCIATED INFORMATION TO APPEAR ON THE L ECAM DISPLAY UNIT

3. PEA LIGHT (AMBER)

   COMES ON WHEN THE POINTER EXCEEDS THE RED LINE.

4. BITE TEST

   USED TO TEST INDICATOR OPERATION

   WHEN PUSHED POINTER, DIGITAL COUNTER; AND OVERTEMPERATURE POINTER INDICATE 975°C (BLUE DOT ON AN ANALOG SCALE) AND OVER TEMPERATURE WARNINGS OCCUR (REF. RED LINE) IF THE INDICATOR IS OPERATIONAL

5. DIGITAL COUNTER

   INDICATES THE EGT IN DIGITAL FORM

   IF THE INDICATOR IS NOT POWERED, THE COUNTER IS BLACK
   IN THE CASE OF A SIGNAL FAILURE, THE COUNTER DISPLAYS - - - -

   DURING DIGITAL DISPLAY TEST, THE COUNTER WILL SHOW 8888 FLASHING

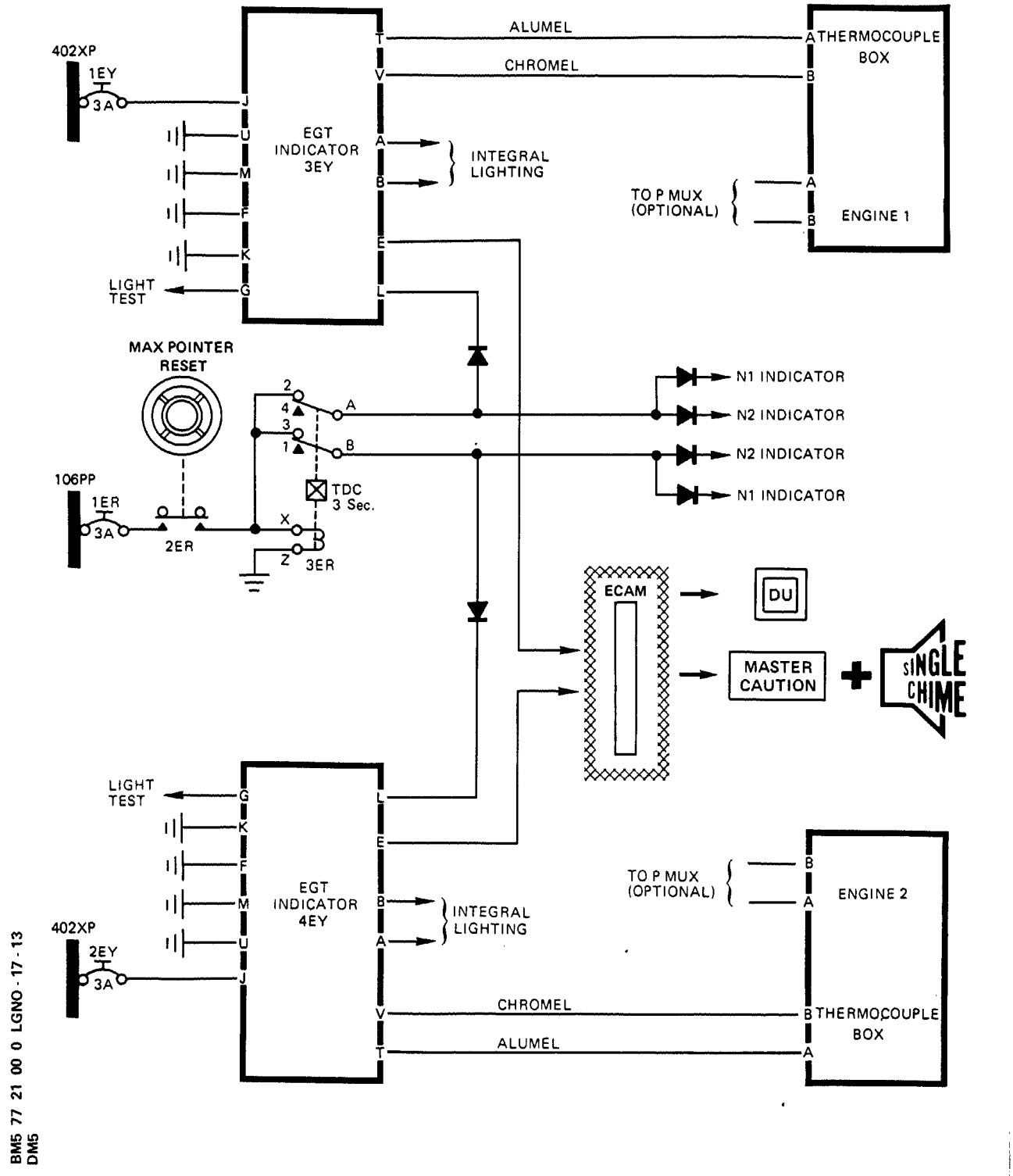
6. POINTER

   INDICATES EGT ON THE ANALOG SCALE (0 - 1000° C)
   IF THE INSTRUMENT NOT POWERED, OR IN THE CASE OF SIGNAL FAILURE THE POINTER SHOW LOWEST VALUE (< 0)

BM5 77 21 00 0 LEM0 01

EGT Indicator
Figure 003

R



EGT Indication - Electrical Circuit
Figure 004

to be carried out
- the amber light located on the right lower part of the indicator (this light comes on when there is an overtemperature)

(4) The **AIDS** function consists in the analog output of the **EGT** data towards the **DFDAU (Ref. 77-31)**

R (5) The test function by means of a bite test, the body of which is flush with the dial, and which is located on the LH lower part of the indicator.

R This bite test can be activated using a rod type tool.

R Operation of this bite test has for effect :
- to deflect the pointers (**EGT**, overtemperature) up to the blue dot on the graduated quadrant (**EGT = 975°C**)
- to have **975°C** value displayed on the **EGT** static display
- to open the overtemperature switch (**EGT ≥ 960°C**) and thus trigger the warnings described in para. (3).
- to transmit a signal corresponding to **975°C** to the **AIDS** output.

R When this bite test is released, the test system returns in standby position, except the overtemperature pointer which remains in position (it will return in standby position after activation of **MAX POINTER RESET** pushbutton switch)

(6) The test display function which is identical to the function described for the **N1** indicator (**Ref. 77-11**, para. **3.A. (7)**).

EXHAUST GAS TEMPERATURE INDICATING SYSTEM - ADJUSTMENT/TEST

1. Resistance Test (Procedure with Barfield Test Unit)

A. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform
B.	Circuit Breaker Safety Clips
C. 2C14966	Barfield Test Unit (TT- 1000A)
R D. Material No.C02-053	Anti-Seize Compounds, Lubricant, Oils
R	(Ref. 70-00-00)
R E. Material No.C02-060	Anti-Seize Compounds, Lubricant, Oils
R	(Ref. 70-00-00)
R F. Material No.C04-035	Cleaning Compounds and Solvents
R	(Ref. 70-00-00)
Referenced Procedures	
- 71-13-00, P. Block 301	Cowl Doors
- 24-41-00, P. Block 301	AC External Power Control
- 70-00-00, P. Block 201	Standard Practices
R - 77-21-00, P. Block 601	EGT Indicating System
R - 77-21-04, P. Block 401	Thermocouple Probes

B. Job Set-Up

(1)Open, safety and the following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
133VU	ENG1/EGT	1EY	333/T73
133VU	ENG2/EGT	2EY	333/T74

(2)Open, safety and tag circuit breakers for the appropriate engine and open fan, thrust reverser and core cowl doors (Ref. 71-13-00, P. Block 301).

(3)Install access platform.

(4)Strictly follow the instructions in the Task Supporting Data for the exhaust gas temperature indicating system when you do these tests (Ref. 70-00-00, P. Block 201).

(5)Connect adaptor cable to tester.
(Ref. Fig. 502, 503, 504)
(Ref. Fig. 505, 506, 507)

(6)Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00 P. Block 301).

NOTES : The adapter unit is calibrated to the tester bearing the same serial number. Used with a tester assigned a different serial number could produce erroneous readings, therefore this practice is discouraged.
Allow the harness sufficient time to stabilize at ambient before performing temperature tests.

NOTE : The EGT indicating system must be at an ambient temperature of 0 to 40 degrees C (32 to 104 degrees F) when you do these tests.

C. Indicator Check
(1)Disconnect the top (P3) and the bottom (P4) thermocouple (T/C) harness connectors, and the (P2) cap from the junction box (Ref. Fig. 502).
(2)Connect the adapter cable connector No. 1 and the cable adapter No. 101-00906 together, and connect to the junction box connector (J3).
(3)Prepare the Barfield tester and the adapter unit as follows :
(a)Turn the adapter unit switch to A/E.
(b)Turn the Barfield tester FUNCTION switch to the INDICATOR TEST position.
(c)Turn the Barfield tester TEMPERATURE ADJUSTMENT KNOB until the Barfield tester shows 1036°C.
(4)The flight compartment EGT indicator must show 960°C ± 4°C.

(a)If the indication is correct, go to step 1.D. resistance check.
NOTE : You can select other temperatures to test the EGT indicator (Ref. Fig. 501).
CAUTION : MAKE SURE YOU DO NOT SET THE FLIGHT COMPARTMENT EGT INDICATOR FOR TEMPERATURES MORE THAN 1000°C. THIS CAN CAUSE DAMAGE TO THE EGT INDICATOR.
(b)If the flight compartment EGT indication is incorrect, do the steps that follow :
(5)Disconnect the aircraft T/C cable lead (P1), the No. 1 cable adapter lead and the cable adapter No. 101-00906 from the junction box.
(6)Connect the No. 2 cable adapter lead connector to the aircraft connector lead (P1).
(7)Prepare the Barfield tester and adapter unit for the test as follows :
(a)Turn the adapter unit switch to A/E.
(b)Turn the Barfield tester unit function switch to INDICATOR TEST.
(c)Put the Barfield tester RESISTANCE RANGE switch in the 2M ohms position.
(d)Turn the Barfield tester TEMPERATURE ADJUSTMENT KNOB until the Barfield tester shows 960°C.
(8)The flight compartment EGT indicator must show 960°C ± 4°C.
(a)If the flight compartment EGT indicator shows the correct temperature, replace the junction box and do steps 1.C. thru 1.C. (4).
NOTE : If you want to do more tests, the Barfield tester can be set to different temperatures (Ref. Fig. 501).
CAUTION : MAKE SURE YOU DO NOT SET FOR FLIGHT COMPARTMENT EGT INDICATOR FOR TEMPERATURES MORE THAN 1000°C. THIS CAN CAUSE DAMAGE TO THE EGT INDICATOR.
(b)If the flight compartment EGT indicator shows the incorrect temperature, repair the aircraft indicating system.

D. Do a T/C harness resistance test. Do the steps that follow :
(1)Disconnect the top T/C harness connector (P3) and the bottom T/C harness connector (P4) from the junction box.
(2)Connect the No. 3 adapter cable connector and the cable adapter No. 101-00905 together, and connect to the top T/C harness connector (P3).

FOR 60 DEGREE SHUNT

INPUT (TESTER SETTING)	OUTPUT (COCKPIT INDICATOR READING)
1080	1000
1025	950
971	900
916	850
861	800
807	750
752	700
698	650
645	600
590	550
536	500
483	450
429	400
375	350
322	300
269	250
215	200
161	150
107	100
54	50
0	0
1036	960

Tester/Cockpit Indicator Comparison
Figure 501

R

(3)Prepare the Barfield tester and the adapter for the resistance test :
(a)Turn the Barfield tester function switch to the **RESISTANCE MEASURE** position.
(b)Turn the Barfield tester **RESISTANCE RANGE** selector to 20 ohms.
(c)Measure the resistance of the top T/C harness and each probe. Set the selector switch and push the **PUSH TO MEASURE** button at each of the positions that follow :
- T/C No. 1 selector switch A/E, write down the resistance
- T/C No. 2 selector switch B/E, write down the resistance
- T/C No. 7 selector switch C/E, write down the resistance
- T/C No. 8 selector switch D/E, write down the resistance.

NOTE : This EGT indicating system can use either Type 1 (Pre SB GE 72-0872 [Ametek]) EGT probes or Type 2 (Post SB GE 72-0872 [Weston]) EGT probes. The resistance values will be slightly different.

PRE SB GE 72-0872

(d)The resistance at each switch position must read 4.55 to 6.40 ohms for Type 1 (Ametek) probes (Ref. Fig. 509).

END PRE SB GE 72-0872

POST SB GE 72-0872

(d)The resistance at each switch position must read 5.33 to 7.17 ohms for Type 2 (Weston) probes (Ref. Fig. 510).

END POST SB GE 72-0872

(e)Remove the No. 3 adapter cable connector and the cable adapter No. 101-00905 from the top T/C harness connector (P3).
(f)Connect the No. 3 adapter cable connector and the cable adapter No. 101-00905 to the lower T/C harness connector (P4).
(g)Measure the resistance of the bottom T/C harness and each probe. Set the selector switch and push the **PUSH TO MEASURE** button at each of the positions that follow :
- T/C No. 3 selector switch A/E, write down the resistance
- T/C No. 4 selector switch B/E, write down the resistance
- T/C No. 5 selector switch C/E, write down the resistance
- T/C No. 6 selector switch D/E, write down the resistance.

PRE SB GE 72-0872

(h)The resistance at each switch position must read 4.55 to 6.40 ohms for Type 1 (Ametek) probes (Ref. Fig. 509).

END PRE SB GE 72-0872

POST SB GE 72-0872

(h)The resistance at each switch position must read 5.33 to 7.17 ohms for Type 2 (Weston) probes (Ref. Fig. 510).

END POST SB GE 72-0872

(i)When one of the tests are not in limits, find the cause between the T/C harness and the T/C probe. Do the steps that follow :

CAUTION : DO NOT APPLY SIDE-LOADS TO THE THERMOCOUPLE HARNESS PIGTAIL LEADS WHEN YOU DISCONNECT THEM. DAMAGE TO THE PROBE STUDS OR THE PIGTAIL LEADS CAN OCCUR.

R CAUTION : BEFORE YOU REMOVE THE THERMOCOUPLE HARNESS CONNECTOR NUTS
R FROM THE EGT PROBE, PUT A SMALL AMOUNT OF COMPOUND ON THE
R ENDS OF THE EGT PROBE STUDS AND ON THE THREADS OF THE
R HARNESS CONNECTOR NUTS, OR DAMAGE TO EGT PROBE STUDS MAY

R OCCUR.
R - Apply a small amount of penetrating oil (Material No.C02-060 or
R Material No.C02-053) at the ends of the EGT probe studs and on
R the threads of the harness connector nut.
R - Disconnect the T/C harness leads from T/C probe to be tested.
R WARNING : ISOPROPYL ALCOHOL IS TOXIC AND FLAMMABLE. USE PERSONAL
R PROTECTION EQUIPMENT. USE IN A WELL-VENTILATED AREA.
- If penetrating oil (Material No.C02-060 or Material No.C02-053)
R is used to remove the harness connector nuts from the EGT
R thermocouple probe, clean the threaded surfaces with cotton swab
R or brush soaked with isopropyl alcohol (Material No.C04-035)
R and allow to air dry prior to reassembly.
- Install a shorting bar across the T/C harness leads.
- Connect the No. 3 adapter cable connector and the cable adapter No. 101-00905 to the applicable T/C harness for the test.
- Prepare the Barfield tester and the adapter for the test :
Turn the Barfield tester FUNCTION switch to RESISTANCE MEASURE.
Turn the Barfield tester RESISTANCE RANGE switch to 20 ohms.

(j) Measure the resistance of the top T/C harness. Set the selector switch and push the PUSH TO MEASURE button at each of the positions that follow :
- T/C No. 1 selector switch A/E, write down the resistance
- T/C No. 2 selector switch B/E, write down the resistance
- T/C No. 7 selector switch C/E, write down the resistance
- T/C No. 8 selector switch D/E, write down the resistance.

(k) The resistance at each switch position must read 2.59 to 3.37 ohms.

(l) Measure the resistance of the bottom T/C harness. Set the selector switch and push the PUSH TO MEASURE button at each of the positions that follow :
- T/C No. 3 selector switch A/E, write down the resistance
- T/C No. 4 selector switch B/E, write down the resistance
- T/C No. 5 selector switch C/E, write down the resistance
- T/C No. 6 selector switch D/E, write down the resistance.

(m) The resistance at each switch position must read 2.59 to 3.37 ohms.

(n) If the resistance tests are out of limits, replace the defective T/C harness.

(o) If the resistance tests are in limits, test the T/C probes as follows :
- Disconnect the adapter cable from the Barfield tester.
- Connect the test cable with the alligator clips to the Barfield tester.
- Connect the alligator clips to the applicable T/C probe for the test.
Prepare the Barfield tester for the test :
. Turn the FUNCTION switch to RESISTANCE MEASURE.
. Turn the RESISTANCE RANGE switch to 20 ohms.
Measure the T/C probe resistance. Push the PUSH TO MEASURE button.
NOTE : This EGT indicating system can use either Type 1 (Pre SB GE 72-0872 [Ametek]) EGT probes or Type 2 (Post SB GE 72-0872 [Weston]) EGT probes. The resistance values will be slightly different.

PRE SB GE 72-0872

The resistance must read 1.96 to 3.03 ohms for Type 1 (Ametek) probes.

END PRE SB GE 72-0872

POST SB GE 72-0872

The resistance must read 2.73 to 3.80 ohms for Type 2 (Weston) probes.

END POST SB GE 72-0872

R Inspect all probes that fail to meet resistance or insulation
R limits (Ref. 77-21-00, P. Block 601). Replace the EGT probe(s) as
R necessary (Ref. 77-21-04, P. Block 401).

Disconnect the test cable with the alligator clips from the Barfield tester.

E. Do a shunt junction box resistance test. Do the steps that follow :

(1)Connect the adapter cable to the Barfield tester.

(2)Disconnect the (P1), (P3) and (P4) electrical connectors and the (P2) cap from the shunt junction box.

(3)Connect the No. 4 adapter cable connector to the (J1) connector on the shunt junction box.

(4)Connect the No. 5 adapter cable connector and the cable adapter No. 101-00906 to the (J3) connector on the shunt junction box.

(5)Prepare the Barfield tester and the adapter cable for the test:

(a)Turn the Barfield tester **FUNCTION** switch to **RESISTANCE MEASURE.**

(b)Turn the Barfield tester **RESISTANCE RANGE** switch to 20 ohms.

(c)Connect the adapter cable to **A/B.**

(6)Push the **PUSH TO MEASURE** button.

(a)For a 45° shunt, the resistance must show 10.03 ohms ± 0.3 ohms.

(b)For a 60° shunt, the resistance must show 13.5 ohms ± 0.3 ohms.

(7)Replace the shunt junction box if it is found unsatisfactory.

(8)Disconnect the No. 5 adapter cable connector and the cable adapter No. 101-00906 from the (J3) connector on the shunt junction box.

(9)Disconnect the No. 4 adapter cable connector from the (J1) connector on the shunt junction box.

F. Do a T/C harness insulation test for short circuit to ground. Do the steps that follow :

(1)Connect the top T/C harness electrical connector (P3) to the (J3) connector on the shunt junction box.

(2)Connect the bottom T/C harness electrical connector (P4) to the (J4) connector on the shunt junction box.

(3)Disconnect the aircraft electrical connector (P1) from the shunt junction box.

(4)Disconnect the cap (P2) from the shunt junction box.

(5)Prepare the Barfield tester and the No. 4 adapter cable for the test :

(a)Turn the Barfield tester **FUNCTION** switch to **RESISTANCE MEASURE.**

(b)Set the Barfield tester **RESISTANCE RANGE** to 2M.

(c)Set the adapter selector switch to **GND.**

(d)Set the adapter **A - B** switch to **B.**

(e)Connect the No. 4 adapter cable to the (J1) connector on the shunt junction box.

(6)Push the **PUSH TO MEASURE** button. The resistance must show a minimum of 1 meg ohm.

NOTE : The indication on the Barfield tester will increase to 2.000 meg

ohms, then decrease to 1.000 meg ohm if the indication is more than 2 meg ohms. The resistance is unsatisfactory if the indication shown is less than 1.000 meg ohm.

(7)If the resistance is less than 1.000 meg ohm, disconnect the :
(a)Top T/C harness connector (P3) from the shunt junction box.
(b)Bottom T/C harness connector (P4) from the shunt junction box.

(8)Push the PUSH TO MEASURE button on the Barfield tester. The indication must show a minimum of 1 meg ohm.
(a)If the resistance shown is less than 1 meg ohm, replace the shunt junction box.
(b)If the resistance shown is more than 1 meg ohm, connect the top T/C harness connector (P3) to the shunt junction box.
(c)Push the PUSH TO MEASURE button on the Barfield tester. If the resistance is :
Less than 1 meg ohm, isolate the problem with the top T/C harness system.
More than 1 meg ohm, isolate the problem with the bottom T/C harness system.

G. Isolate the top or bottom T/C system defect.

(1)Connect the No. 3 adapter cable connector and the cable adapter No. 101-00905 together, and connect to the top (P3) or bottom (P4) T/C harness system.
CAUTION : DO NOT APPLY SIDE-LOADS TO THE THERMOCOUPLE HARNESS PIGTAIL LEADS WHEN YOU DISCONNECT THEM. DAMAGE TO THE PROBE STUDS OR THE PIGTAIL LEADS CAN OCCUR.
R CAUTION : BEFORE YOU REMOVE THE THERMOCOUPLE HARNESS CONNECTOR NUTS
R FROM THE EGT PROBE, PUT A SMALL AMOUNT OF COMPOUND ON THE ENDS
R OF THE EGT PROBE STUDS AND ON THE THREADS OF THE HARNESS
R CONNECTOR NUTS, OR DAMAGE TO EGT PROBE STUDS MAY OCCUR.
R (2)Apply a small amount of penetrating oil (Material No.C02-060 or
R Material No.C02-053) at the ends of the EGT probe studs and on
R the threads of the harness connector nut.
R (3)Disconnect all the T/C probe harness connector leads for the applicable
R T/C harness to be tested.
R WARNING : ISOPROPYL ALCOHOL IS TOXIC AND FLAMMABLE. USE PERSONAL
R PROTECTION EQUIPMENT. USE IN A WELL-VENTILATED AREA.
R (4)If penetrating oil (Material No.C02-060 or Material No.C02-053) is used
R to remove the harness connector nuts from the EGT thermocouple probe,
R clean the threaded surfaces with cotton swab or brush soaked with
R isopropyl alcohol (Material No.C04-035) and allow to air dry prior to
R reassembly.
R (5)Push the PUSH TO MEASURE button on the Barfield tester.
(a)The resistance must be more than 1 meg ohm.
(b)If the resistance is less than 1 meg ohm, replace the applicable T/C harness.
(c)If the resistance is found satisfactory, go to the next step.
R (6)Connect one T/C probe to the applicable T/C harness as follows :
R CAUTION : BEFORE YOU TORQUE THE CONNECTOR NUTS, MAKE SURE THE
R THERMOCOUPLE PIGTAIL LEADS WILL NOT TOUCH OTHER ENGINE PARTS
R DURING ENGINE OPERATION OR DAMAGE TO THE THERMOCOUPLE CABLE

R CAN OCCUR.
R CAUTION : DO NOT APPLY SIDE-LOADS TO THE THERMOCOUPLE CABLE PIGTAIL LEADS
R WHEN YOU INSTALL THEM. DAMAGE TO THE PROBE STUDS OR THE
R MAGNAFORM SLEEVES CAN OCCUR.
R CAUTION : MAKE SURE YOU INSTALL THE CONNECTOR NUTS ONTO THE THERMOCOUPLE
R PROBE STUDS BY HAND BEFORE YOU TORQUE THE NUTS. OTHERWISE
R DAMAGE TO THE THREADS ON THE CONNECTOR NUTS OR THE PROBE STUDS
R CAN OCCUR.
R CAUTION : DO NOT OVERTORQUE THE CONNECTOR NUTS WHEN YOU INSTALL THEM.
R DAMAGE TO THE PIGTAIL LEAD CONNECTOR NUTS OR THE THERMOCOUPLE
R PROBE STUDS CAN OCCUR.
R CAUTION : TO MAINTAIN OUTPUT SIGNAL ACCURACY, HARNESS CONNECTOR
R NUTS AND EGT THERMOCOUPLE PROBE STUDS SHOULD BE FREE OF OIL
R OR CONTAMINATION. OTHERWISE CONTAMINATION CAN RESULT IN A LOSS
R OF PROBE OUTPUT SIGNAL.
R (a)Attach the connector nuts with your hand.
R (b)Make sure the pigtail leads are routed in a smooth, continuous manner
R (Ref. Fig. 511).
R NOTE : The thermocouple probe studs have different diameters (thread
R dimensions). Each connector nut is the same dimension as its
R mating probe stud.
R (c)Tighten the thermocouple probe connector as follows :
R 1 TORQUE the smaller (chromel) connector nut to between 12 and
R 14 lbf.in. (0.14 and 0.16 m.daN).
R 2 TORQUE the larger (alumel) connector nut to between 20 and 30 lbf.
R in. (0.23 and 0.34 m.daN).
R 3 Make sure that all the thermocouple cable pigtail leads are
R connected to thermocouple probes and the probe nuts are tightened
R correctly.
R (7)Push the PUSH TO MEASURE button on the Barfield tester.
(a)The T/C probe is serviceable if more than 1 meg ohm is shown.
R (b)Inspect all probes that fail to meet resistance or insulation
R limits (Ref. 77-21-00, P. Block 601). Replace the EGT probe(s)
R as necessary (Ref. 77-21-04, P. Block 401).
R (8)Continue to test, one at a time, each of the four T/C probes that
remain, of the applicable T/C harness.

H. Test each T/C probe with the Barfield tester and adapter cable with alligator clips.
(1)Prepare the Barfield tester for the test :
(a)Turn the FUNCTION switch to RESISTANCE MEASURE.
(b)Turn the RESISTANCE RANGE switch to 2M.
(2)Connect the alligator clips to the T/C probe to be tested.
(a)Push the PUSH TO MEASURE button on the Barfield tester.
(b)The T/C probe is serviceable if more than 1 meg ohm is shown.
R (c)Inspect all probes that fail to meet resistance or insulation
R limits (Ref. 77-21-00, P. Block 601). Replace the EGT probe(s)
R as necessary (Ref. 77-21-04, P. Block 401).

I. Close-Up
(1)De-energize the aircraft electrical network and disconnect electrical

ground power unit (Ref. 24-41-00, P. Block 301).
(2)Disconnect adaptor cable to tester.
(3)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(4)Remove access platform.
(5)Close core, thrust reverser and fan cowl doors (Ref. 71-13-00, P. Block 301).
(6)Remove safety clips and tags and close circuit breakers 1KG, 1JH, 2JH, 1KM, 2KM, 1EY and 2EY.

2. Resistance Test (Alternate Procedure)

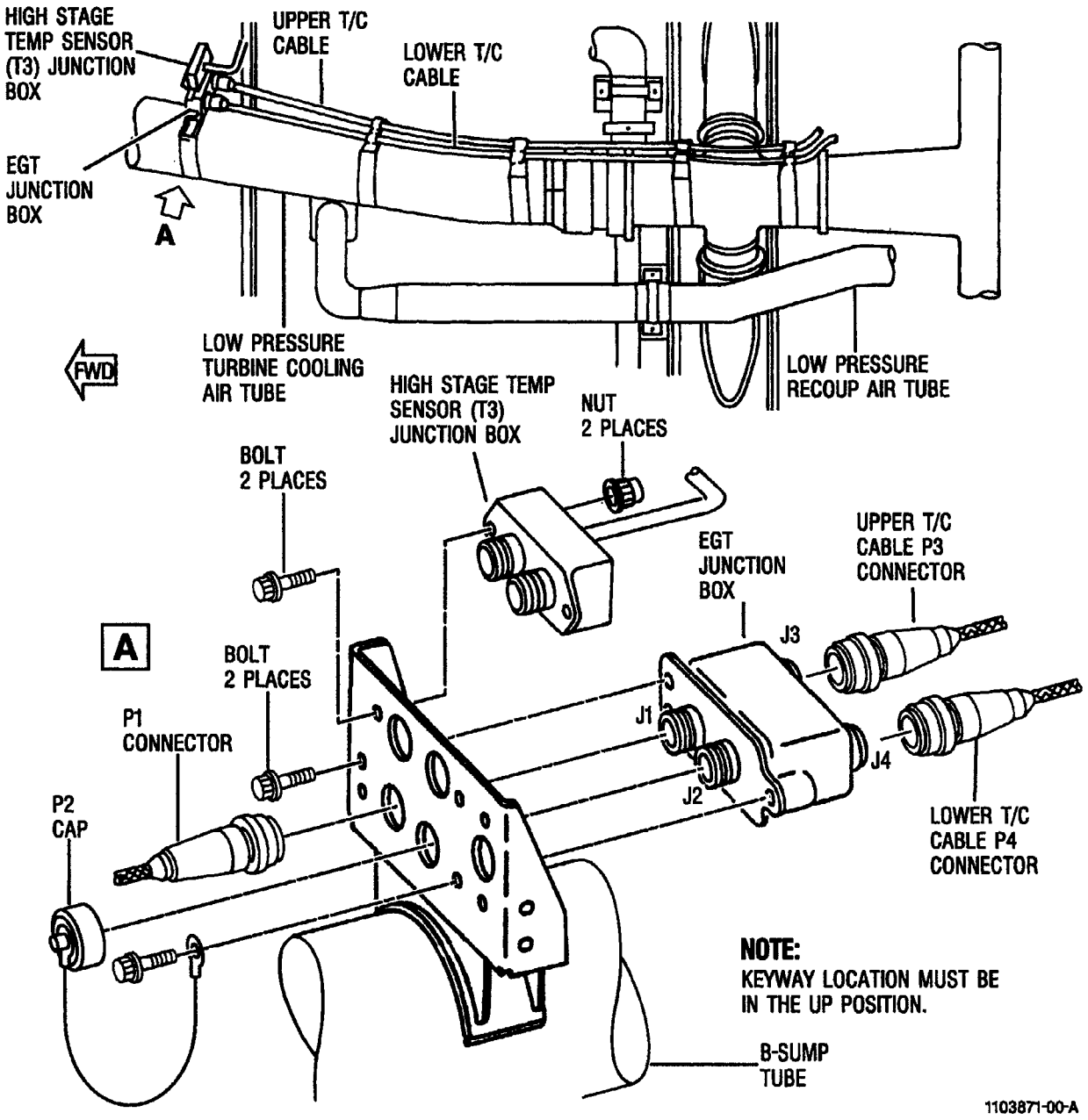
A. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform
B.	Circuit Breaker Safety Clips
C.	Digital Multimeter
D.	Hi-Pot/Megohmmeter
R E. Material No.C02-053	Anti-Seize Compounds, Lubricant, Oils
R	(Ref. 70-00-00)
R F. Material No.C02-060	Anti-Seize Compounds, Lubricant, Oils
R	(Ref. 70-00-00)
R G. Material No.C04-035	Cleaning Compounds and Solvents (Ref. 70-00-00)
Referenced Procedures	
- 71-13-00, P. Block 301	Cowl Doors
R - 77-21-00, P. Block 601	EGT Indicating System
R - 77-21-04, P. Block 401	Thermocouple Probes
- 70-00-00, P. Block 201	Standard Practices
- 77-21-01, P. Block 401	EGT Thermocouple Harness

B. Job Set-Up
(1)Open, safety and tag the following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
133VU	ENG1/EGT	1EY	333/T73
133VU	ENG2/EGT	2EY	333/T74

(2)Open, safety and tag circuit breakers for the appropriate engine and open fan, thrust reverser and core cowl doors (Ref. 71-13-00, P. Block 301).
(3)Install access platform.
(4)Strictly follow the instructions in the Task Supporting Data for the exhaust gas temperature indicating system when you do these tests (Ref. 70-00-00, P. Block 201).
NOTE : The EGT indicating system must be at an ambient temperature of 0 to 40 degrees C (32 to 104 degrees F) when you do these tests.



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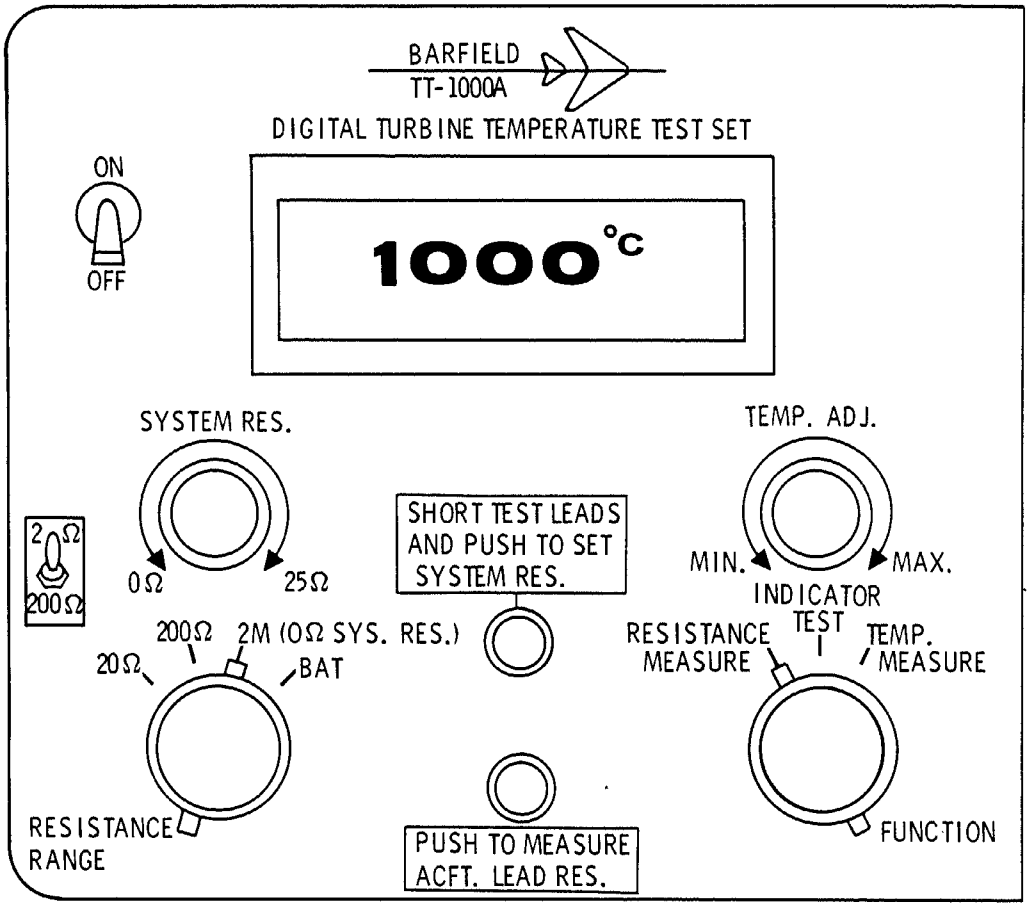
Junction Box
Figure 502



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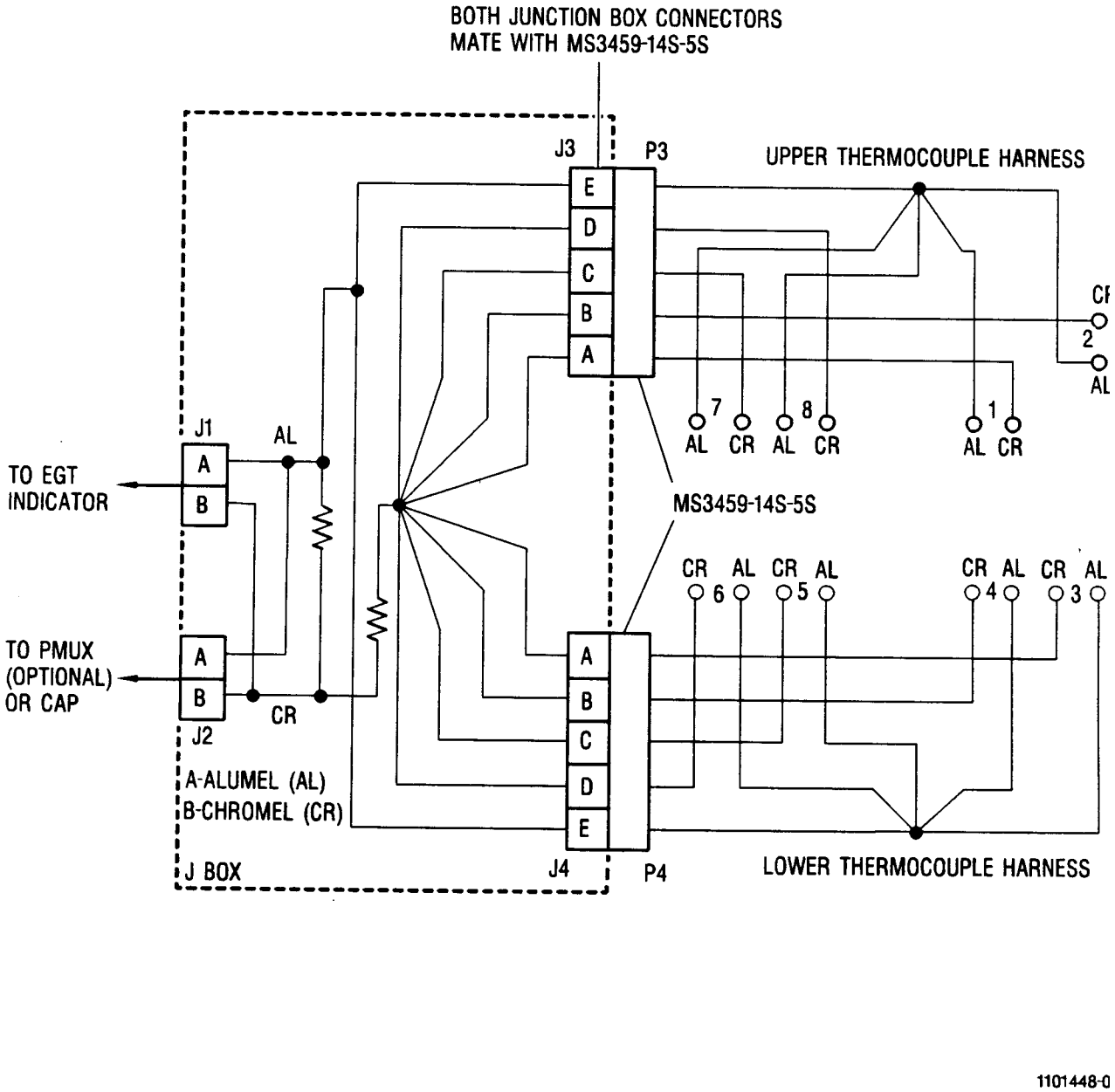
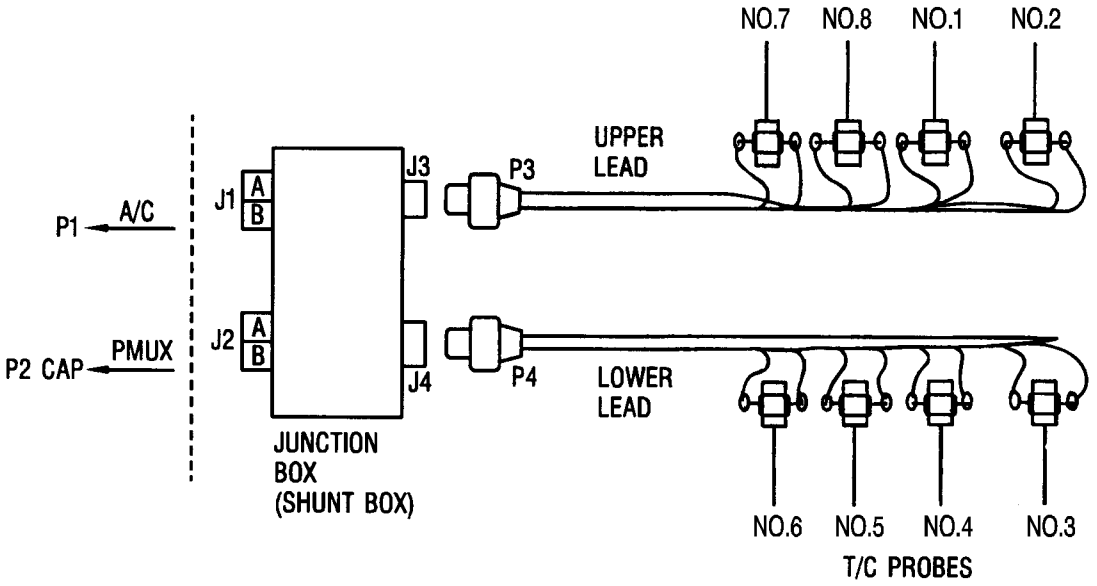
DM5

Barfield Test Unit (TT. 1000A)
Figure 503



Thermocouple Electrical Diagram
Figure 504



T/C PROBE	ENGINE POSITION
NO. 1	1:00 O'CLOCK
NO. 2	2:00 O'CLOCK
NO. 3	4:00 O'CLOCK
NO. 4	5:00 O'CLOCK
NO. 5	7:00 O'CLOCK
NO. 6	8:00 O'CLOCK
NO. 7	10:00 O'CLOCK
NO. 8	11:00 O'CLOCK

NOTE:
T/C PROBE POSITIONS ARE AFT LOOKING FORWARD.

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Thermocouple Electrical Diagram
Figure 505

C. Test the T/C harness insulation resistance. Do the steps that follow : (Ref. Fig. 506, 507)

(1) Disconnect the top T/C harness connector (P3) from the (J3) connector on the shunt junction box.

(2) Disconnect the bottom T/C harness connector (P4) from the (J4) connector on the shunt junction box.

R CAUTION : BEFORE YOU REMOVE THE THERMOCOUPLE HARNESS CONNECTOR NUTS FROM THE EGT PROBE, PUT A SMALL AMOUNT OF COMPOUND ON THE ENDS OF THE EGT PROBE STUDS AND ON THE THREADS OF THE HARNESS CONNECTOR NUTS, OR DAMAGE TO EGT PROBE STUDS MAY OCCUR.

R (3) Apply a small amount of penetrating oil (Material No.C02-060 or Material No.C02-053) at the ends of the EGT probe studs and on the threads of the harness connector nut.

R (4) Disconnect the T/C cable leads from each of the eight T/C probes.

R WARNING : ISOPROPYL ALCOHOL IS TOXIC AND FLAMMABLE. USE PERSONAL PROTECTION EQUIPMENT. USE IN A WELL-VENTILATED AREA.

R (5) If penetrating oil (Material No.C02-060 or Material No.C02-053) is used to remove the harness connector nuts from the EGT thermocouple probe, clean the threaded surfaces with cotton swab or brush soaked with isopropyl alcohol (Material No.C04-035) and allow to air dry prior to reassembly.

R (6) Disconnect the (P1) connector from the (J1) connector on the shunt junction box.

R (7) Disconnect the (P2) cap from the (J2) connector on the shunt junction box.

NOTE : The T/C harness components must be dry before the resistance test is done.

NOTE : Do the resistance tests in C.(6) through E. with components, harnesses, and leads disconnected in C.(1) through (5) above.

R (8) Measure the resistance with a megohmmeter between each T/C cable connector lead and the T/C harness wire braid.

R (9) Measure the resistance with a megohmmeter between circuits that are not connected.

R (10) The insulation resistance must be more than 5 meg ohms at 400 vdc for continued use.

R (11) If the insulation resistance is less than 5 meg ohms, do the steps that follow :

(a) Examine the connectors for surface contamination.

(b) Clean the connectors with a soft bristle brush or a cotton swab moist with Material No.C04-035.

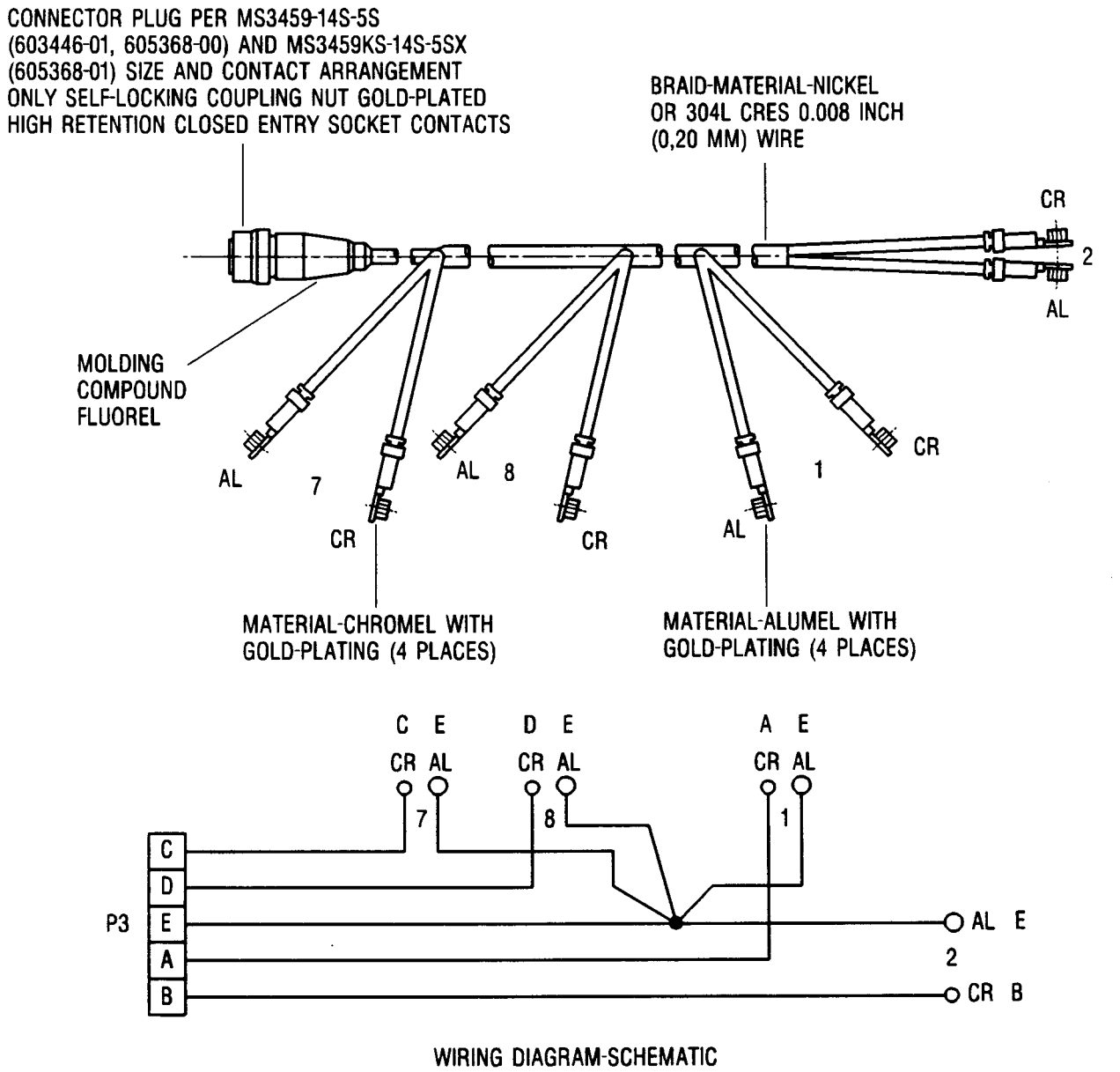
(c) Do the resistance test again. Replace unserviceable parts as necessary.

D. Do a circuit resistance test of the T/C probe short cable lead pairs. Do the steps that follow : (Ref. Fig. 506, 507)

(1) Use a digital multimeter to measure the resistance between the T/C probe cable leads and the T/C harness (P3) and (P4) connectors. Measure with polarity in both directions. Use the average of the resistances.

(2) The resistance must be 2.59 to 3.37 ohms for all the circuits in the tables 1 and 2.

(3) If the circuit resistance is more than the limit :



WIRING DIAGRAM-SCHEMATIC

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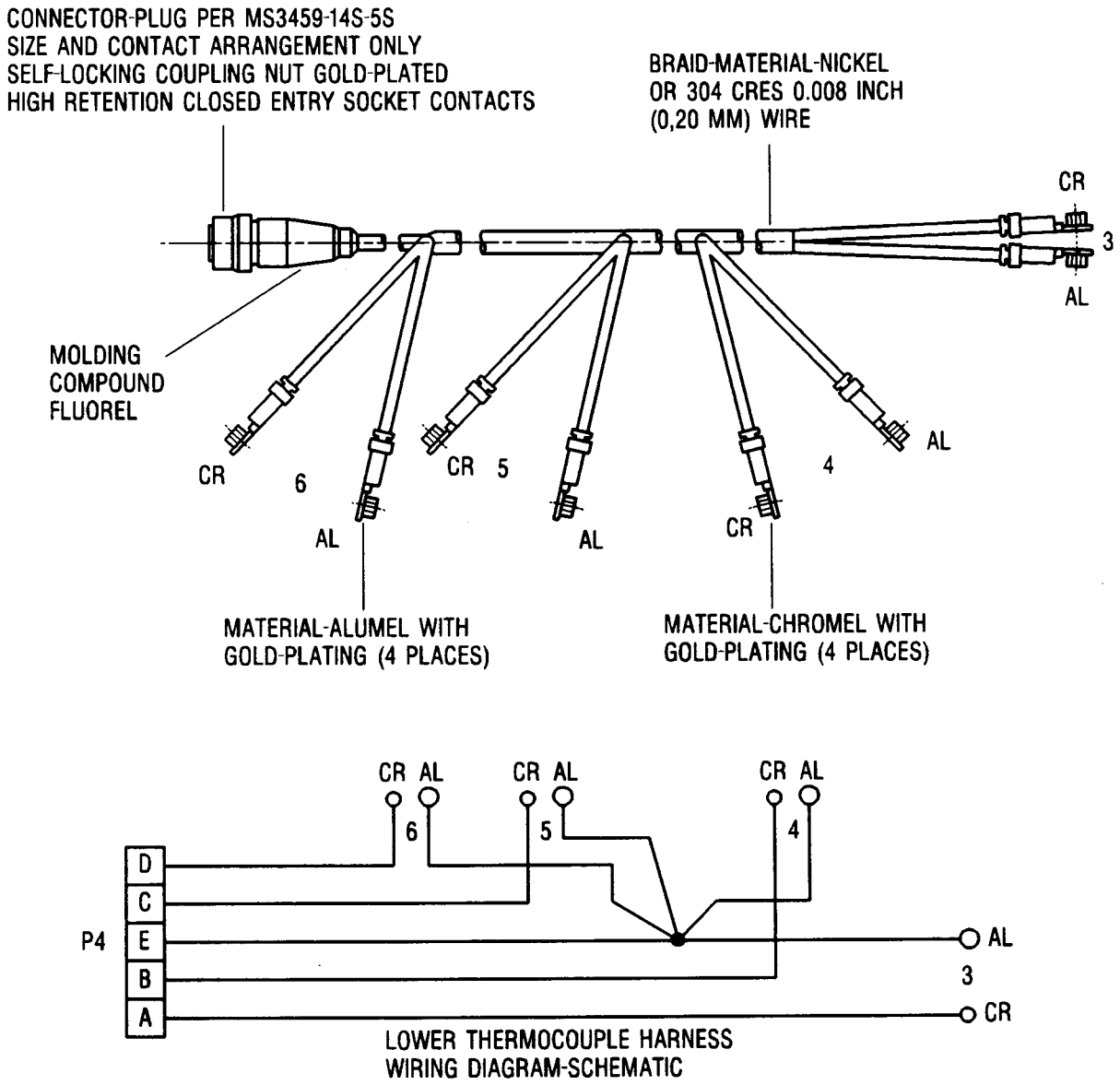
Upper Thermocouple Harness-Adjustment/Test
Figure 506



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Lower Thermocouple Harness-Adjustment/Test
Figure 507

(a)Test the T/C probe leads for an open circuit at the connector or the terminal ends.

(4)If the circuit resistance is less than the limit :

(a)Test for short circuits in the T/C probe leads.

CIRCUIT	PROBE CONNECTOR LEAD PAIR	MEASURED AT CONNECTOR P3 SOCKETS
P3 Probe Pair 1	1AL - 1CR	E and A
P3 Probe Pair 2	2AL - 2CR	E and B
P3 Probe Pair 7	7AL - 7CR	E and C
P3 Probe Pair 8	8AL - 8CR	E and D

TABLE 1 - UPPER HARNESS ASSEMBLY CIRCUIT RESISTANCE

CIRCUIT	PROBE CONNECTOR LEAD PAIR	MEASURED AT CONNECTOR P4 SOCKETS
P4 Probe Pair 3	3AL - 3CR	E and A
P4 Probe Pair 4	4AL - 4CR	E and B
P4 Probe Pair 5	5AL - 5CR	E and C
P4 Probe Pair 6	6AL - 6CR	E and D

TABLE 2 - LOWER HARNESS ASSEMBLY CIRCUIT RESISTANCE

E. Thermocouple Probe - Resistance Test

WARNING : OBEY THE INSTRUCTIONS FOR THIS PROCEDURE WHEN YOU DISCONNECT THE PIGTAIL LEADS FROM THE EGT PROBES. IF YOU DO NOT OBEY THE INSTRUCTIONS, YOU CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

CAUTION : DO NOT APPLY SIDE-LOADS TO THE THERMOCOUPLE HARNESS PIGTAIL LEADS WHEN YOU DISCONNECT THEM. DAMAGE TO THE PROBE STUDS OR THE PIGTAIL LEADS CAN OCCUR.

R CAUTION : BEFORE YOU REMOVE THE THERMOCOUPLE HARNESS CONNECTOR NUTS
R FROM THE EGT PROBE, PUT A SMALL AMOUNT OF COMPOUND ON THE ENDS
R OF THE EGT PROBE STUDS AND ON THE THREADS OF THE HARNESS
R CONNECTOR NUTS, OR DAMAGE TO EGT PROBE STUDS MAY OCCUR.

R (1)Apply a small amount of penetrating oil (Material No.C02-060 or
R Material No.C02-053) at the ends of the EGT probe studs and on
R the threads of the harness connector nut.

R (2)Disconnect the EGT probe(s) from the pigtail leads of the EGT harness
R (Ref. 77-21-04, P. Block 401).
R WARNING : ISOPROPYL ALCOHOL IS TOXIC AND FLAMMABLE. USE PERSONAL
R PROTECTION EQUIPMENT. USE IN A WELL-VENTILATED AREA.

R (3)If penetrating oil (Material No.C02-060 or Material No.C02-053) is used
R to remove the harness connector nuts from the EGT thermocouple probe,
R clean the threaded surfaces with cotton swab or brush soaked with
R isopropyl alcohol (Material No.C04-035) and allow to air dry prior to
R reassembly.

R (4)Set the multimeter to check ohms for a maximum probe resistance of
10 ohms.

R (5)Connect the multimeter across the two probe studs.
R (6)Measure the resistance of the T/C. Reverse the leads and repeat the measurement. Use the average of the two resistances.

PRE SB GE 72-0872

NOTE : The resistance must read 1.96 to 3.03 ohms for Type 1 (Ametek) probes.

END PRE SB GE 72-0872

POST SB GE 72-0872

NOTE : The resistance must read 2.73 to 3.80 ohms for Type 2 (Weston) probes.

END POST SB GE 72-0872

R (7)Do the resistance test for the eight EGT probes.
R (8)Inspect all probes that fail to meet resistance or insulation limits (Ref. 77-21-00, P. Block 601).
R (9)Replace the EGT probe(s) as necessary (Ref. 77-21-04, P. Block 401).

CAUTION : BEFORE YOU TORQUE THE CONNECTOR NUTS, MAKE SURE THE THERMOCOUPLE PIGTAIL LEADS WILL NOT TOUCH OTHER ENGINE PARTS DURING ENGINE OPERATION. OTHERWISE DAMAGE TO THE THERMOCOUPLE CABLE CAN OCCUR.

CAUTION : DO NOT APPLY SIDE-LOADS TO THE THERMOCOUPLE CABLE PIGTAIL LEADS WHEN YOU INSTALL THEM.
DAMAGE TO THE PROBE STUDS OR THE MAGNAFORM SLEEVES CAN OCCUR.

CAUTION : MAKE SURE YOU INSTALL THE CONNECTOR NUTS ONTO THE THERMOCOUPLE PROBE STUDS BY HAND BEFORE YOU TORQUE THE NUTS. OTHERWISE DAMAGE TO THE THREADS ON THE CONNECTOR NUTS OR THE PROBE STUDS CAN OCCUR.

CAUTION : DO NOT OVERTORQUE THE CONNECTOR NUTS WHEN YOU INSTALL THEM. DAMAGE TO THE PIGTAIL LEAD CONNECTOR NUTS OR THE THERMOCOUPLE PROBE STUDS CAN OCCUR.

R (10)Connect the thermocouple cable pigtail leads to the thermocouple probe studs with the connector nuts. Attach the connector nuts with your hand. Make sure the pigtail leads are routed in a smooth, continuous manner (Ref. Fig. 511).

NOTE : Each thermocouple probe has two probe studs of different diameters. Each thermocouple cable pigtail lead has two connector nuts of different diameters. This will prevent incorrect installation of the pigtail leads.

(a)TORQUE the smaller connector nut to between 12 and 14 lbf.in. (0.14 and 0.16 m.daN).
TORQUE the larger connector nut to between 20 and 30 lbf.in. (0.23 and 0.34 m.daN).

F. Do a circuit resistance test of the shunt junction box. Test the circuits specified in Table 3 (Ref. Fig. 508).

NOTE : Test the circuit resistance of the shunt junction box at room ambient temperature, 68°F to 77°F (20°C to 25°C).

CIRCUIT	RESISTANCE
J1 or J2 pin A to J3 or J4 pin E	0.10 ohm max

CIRCUIT	RESISTANCE
J1 or J2 pin B to J3 or J4 pin E	223-227 ohms
J1 or J2 pin B to J3 or J4 pin A, B C, or D	13.20-13.80 ohms (60° shunt) 9.73-10.33 ohms (45° shunt)

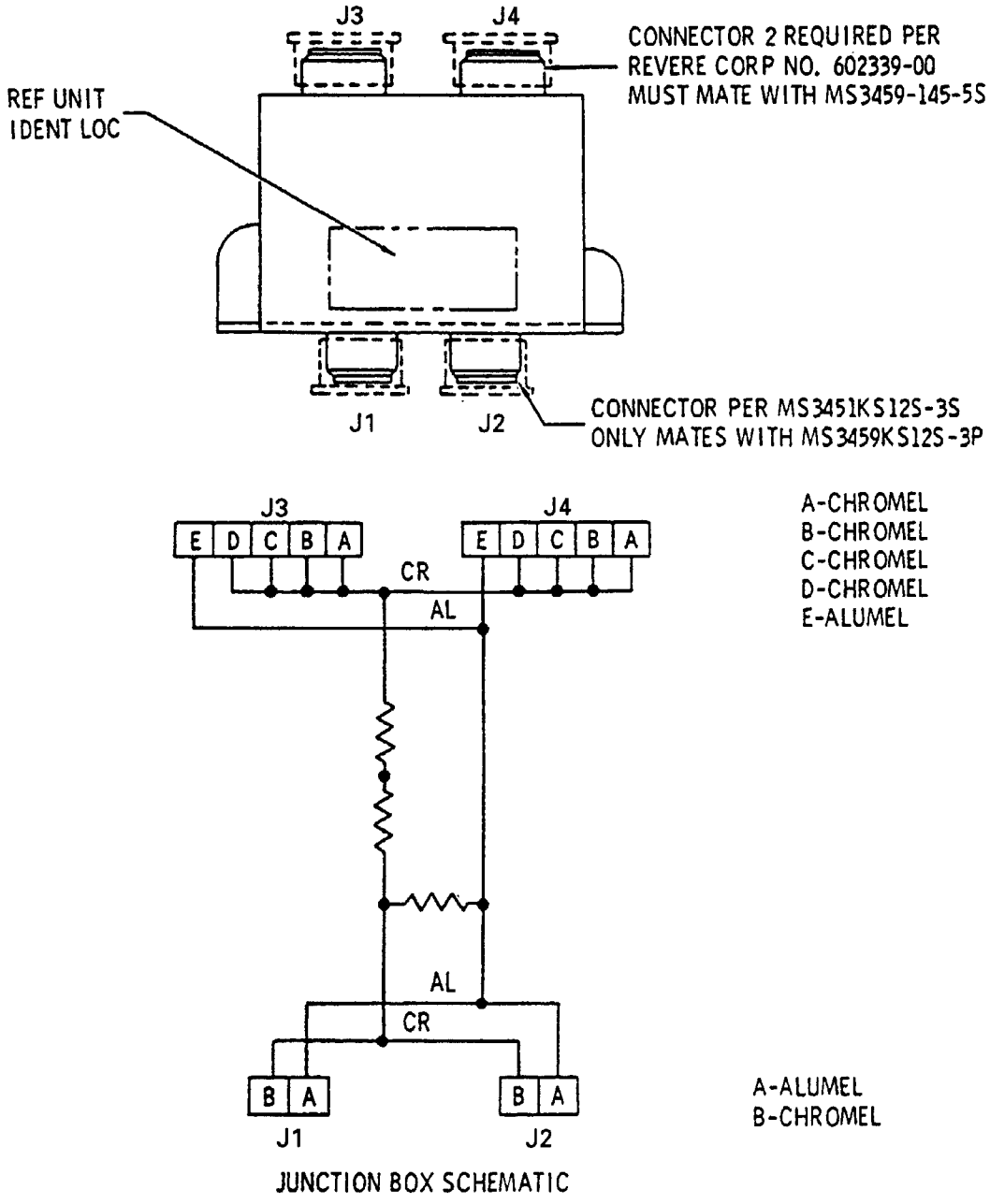
TABLE 3 - JUNCTION BOX RESISTANCE

G. When you complete the resistance tests and replace the defective components, connect these :
(1)Connect and fingertight plus one-eighth turn the top T/C harness connector (P3) to the shunt junction box connector (J3).
(2)Connect and fingertight plus one-eighth turn the bottom T/C harness connector (P4) to the shunt junction box connector (J4).
(3)Then, install and fingertight plus one-eighth turn the cap (P2) to the shunt junction box connector (J2).
(4)Connect and fingertight plus one-eighth turn the harness connector (P1) to the shunt junction box connector (J2).
R (5)Connect the thermocouple cable pigtail leads to the thermocouple
R probe studs with the connector nuts as follows :
R CAUTION : BEFORE YOU TORQUE THE CONNECTOR NUTS, MAKE SURE THE
R THERMOCOUPLE PIGTAIL LEADS WILL NOT TOUCH OTHER ENGINE PARTS
R DURING ENGINE OPERATION OR DAMAGE TO THE THERMOCOUPLE CABLE
R CAN OCCUR.
R CAUTION : DO NOT APPLY SIDE-LOADS TO THE THERMOCOUPLE CABLE PIGTAIL LEADS
R WHEN YOU INSTALL THEM. DAMAGE TO THE PROBE STUDS OR THE
R MAGNAFORM SLEEVES CAN OCCUR.
R CAUTION : MAKE SURE YOU INSTALL THE CONNECTOR NUTS ONTO THE THERMOCOUPLE
R PROBE STUDS BY HAND BEFORE YOU TORQUE THE NUTS. OTHERWISE
R DAMAGE TO THE THREADS ON THE CONNECTOR NUTS OR THE PROBE STUDS
R CAN OCCUR.
R CAUTION : DO NOT OVERTORQUE THE CONNECTOR NUTS WHEN YOU INSTALL THEM.
R DAMAGE TO THE PIGTAIL LEAD CONNECTOR NUTS OR THE THERMOCOUPLE
R PROBE STUDS CAN OCCUR.
R CAUTION : TO MAINTAIN OUTPUT SIGNAL ACCURACY, HARNESS CONNECTOR
R NUTS AND EGT THERMOCOUPLE PROBE STUDS SHOULD BE FREE OF OIL
R OR CONTAMINATION. OTHERWISE CONTAMINATION CAN RESULT IN A LOSS
R OF PROBE OUTPUT SIGNAL.
R (a)Attach the connector nuts with your hand.
R (b)Make sure the pigtail leads are routed in a smooth, continuous manner
R (Ref. Fig. 511).
R NOTE : The thermocouple probe studs have different diameters (thread
R dimensions). Each connector nut is the same dimension as its
R mating probe stud.
R (c)Tighten the thermocouple probe connector as follows :
R 1 TORQUE the smaller (chromel) connector nut to between 12 and
R 14 lbf.in. (0.14 and 0.16 m.daN).

R 2 TORQUE the larger (alumel) connector nut to between 20 and 30 lbf. in. (0.23 and 0.34 m.daN).
R 3 Make sure that all the thermocouple cable pigtail leads are connected to thermocouple probes and the probe nuts are tightened correctly.

H. Not Applicable

I. Close-Up
(1)Make certain that working area is clean and clear of tools miscellaneous items of equipment.
(2)Remove access platform.
(3)Close core thrust reverser and fan cowl doors (Ref. 71-13-00, P. Block 301).
(4)Remove safety clips and tags and close circuit breakers 1KG, 1JH, 2JH, 1KM, 2KM, 1EY and 2EY.



JUNCTION BOX SCHEMATIC

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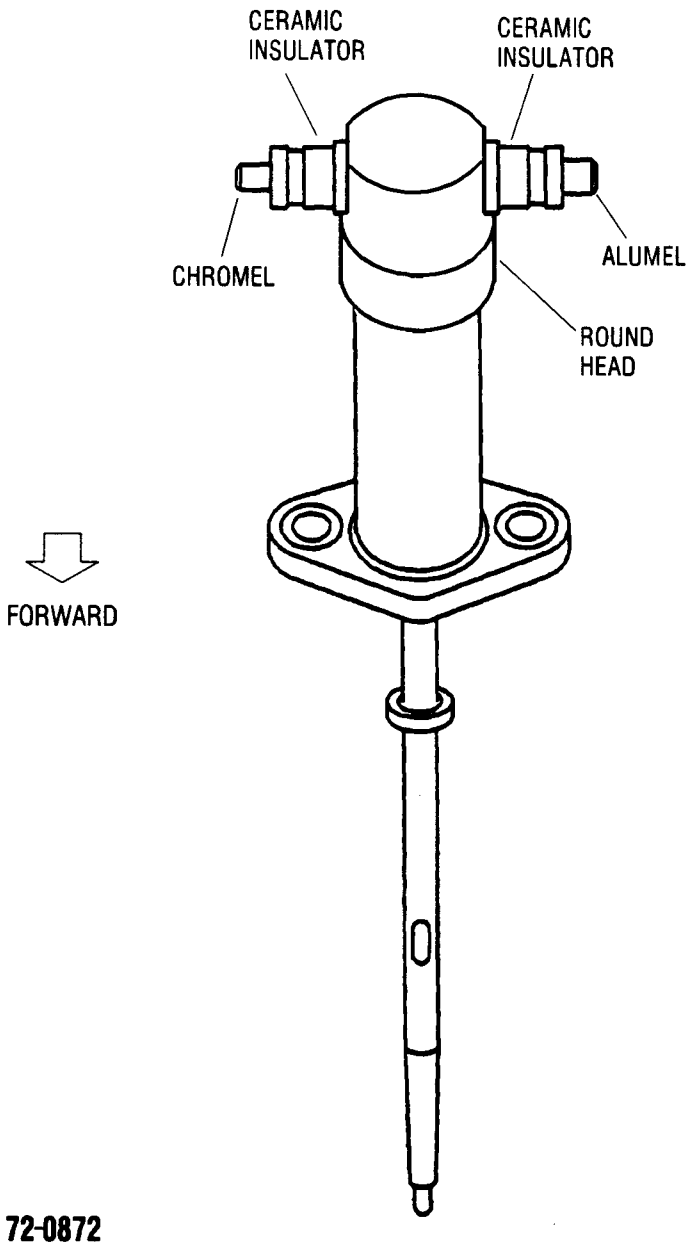
Thermocouple shunt Junction Box
Figure 508



PRE SB GE 72-0872

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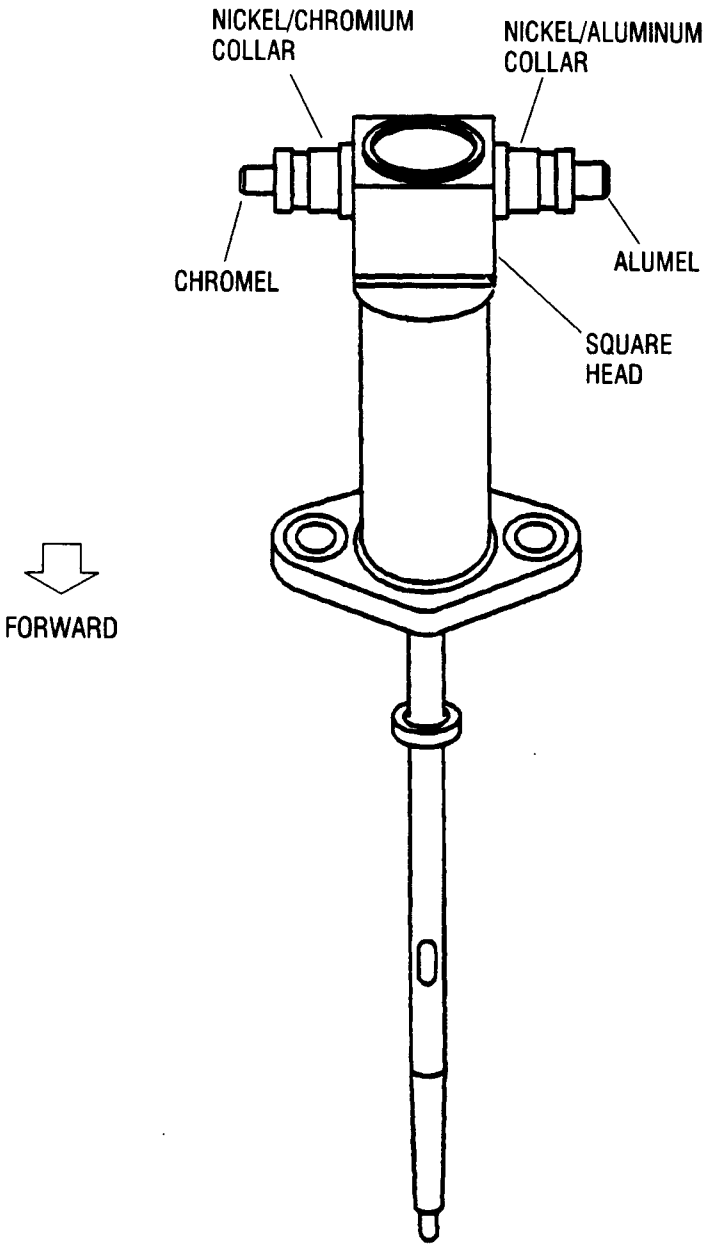
BM5 77 21 00 5 LRMO 00

Type 1 EGT Thermocouple Probe (Ametek)
(Pre SB GE 72-0872)
Figure 509



POST SB GE 72-0872

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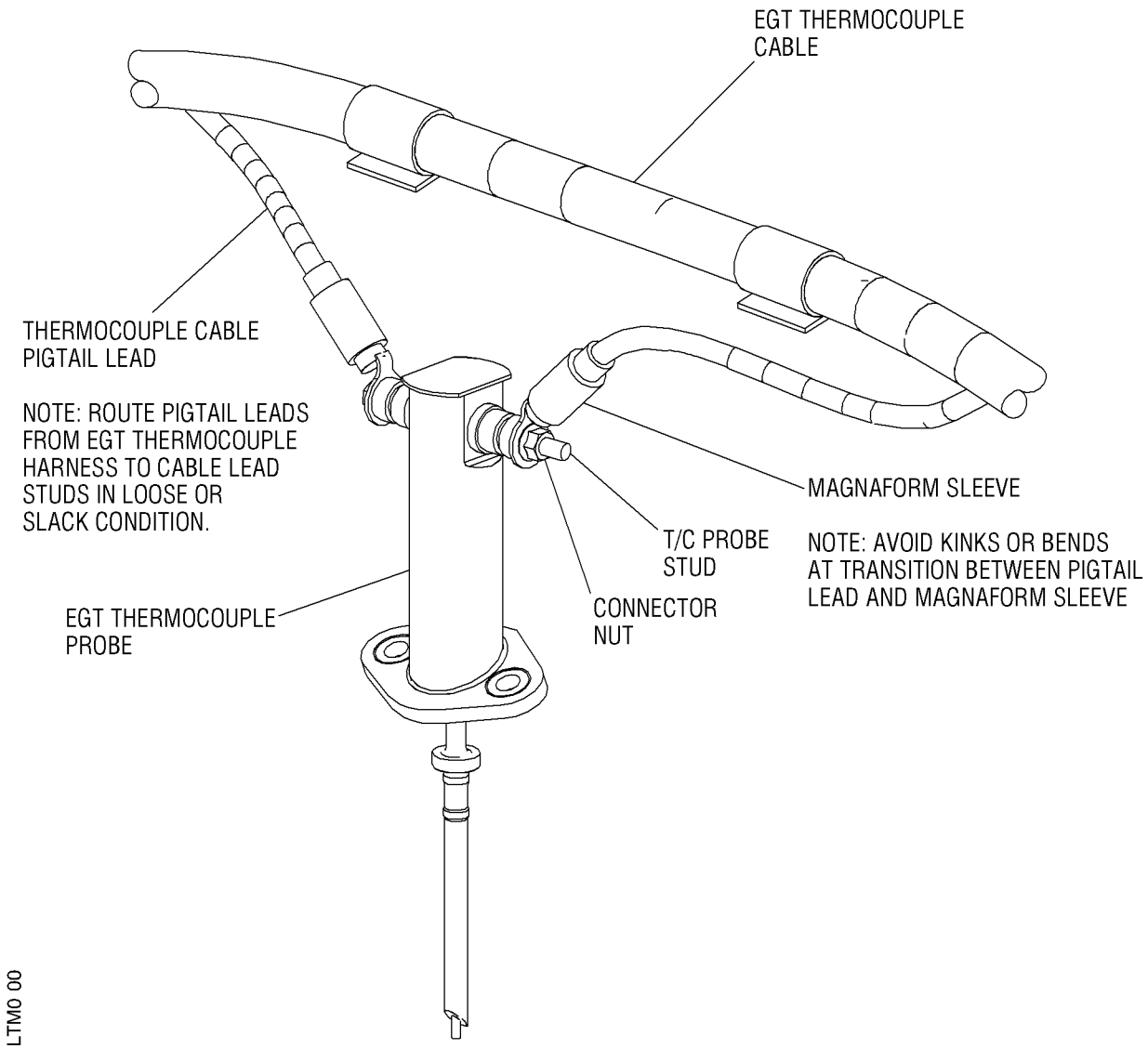
BM5 77 21 00 5 LSM0 00

Type 2 EGT Thermocouple Probe (Weston)
(Post SB GE 72-0872)
Figure 510


EGT THERMOCOUPLE CABLE
THERMOCOUPLE CABLE PIGTAIL LEAD
NOTE: ROUTE PIGTAIL LEADS FROM EGT THERMOCOUPLE HARNESS TO CABLE LEAD STUDS IN LOOSE OR SLACK CONDITION.
MAGNAFORM SLEEVE
T/C PROBE STUD
NOTE: AVOID KINKS OR BENDS AT TRANSITION BETWEEN PIGTAIL LEAD AND MAGNAFORM SLEEVE
CONNECTOR NUT
EGT THERMOCOUPLE PROBE
BM5 77 21 00 5 LTM0 00
1255864-00

EGT Thermocouple Harness Preferred Routing
Figure 511

EXHAUST GAS TEMPERATURE INDICATING SYSTEM - INSPECTION/CHECK

1. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Access Platform
Referenced Procedures	
- 71-13-00, P. Block 301	Cowl Doors
R - 72-57-00, P. Block 601	Low Pressure Turbine Rotor Assembly
R - 77-21-00, P. Block 501	EGT Indicating System
- 77-21-01, P. Block 401	EGT Thermocouple Harness
- 77-21-03, P. Block 401	Junction Box
- 77-21-04, P. Block 401	Thermocouple Probe

2. Procedure

A. Job Set-Up

(1)Open, safety and tag the following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
133VU	ENG1/EGT	1EY	333/T73
133VU	ENG2/EGT	2EY	333/T74

(2)Open, safety and tag the circuit breakers for the appropriate engine and open, thrust reverser and core cowl doors (Ref. 71-13-00, P. Block 301).

(3)Install access platform.

B. Inspection/Check

R (1)Do the test of the exhaust gas temperature (EGT) indicating system
R harness and probes (Ref. 77-21-00, P. Block 501).
R NOTE : Do all the resistance measurements on a cold engine. Hot EGT
R systems give voltage that can change the resistance values.
R (2)Remove thermocouple probes for inspection (Ref. 77-21-04, P. Block 401).
R (3)Visually inspect the following :

Insp/Check	Maximum Serviceable Limits	Remarks
(a)Upper and Lower Thermocouple Cables for :		
1 Damaged or excessively worn connector socket pins.	None allowed.	Replace defective thermocouple cable (Ref. 77-21-01, P. Block 401)
2 Stripped or damaged threads on pigtail nuts.	50% of one entrance thread or 10% each of two entrance threads, provided	Replace defective thermocouple cable (Ref. 77-21-01, P. Block 401)

Insp/Check	Maximum Serviceable Limits	Remarks
	high or displaced metal is removed.	
3 Loose (axial or radial movement) or damaged magnaform sleeve.	None allowed.	Replace defective thermocouple cable (Ref. 77-21-01, P. Block 401)
4 Frayed inverted sleeve.	None allowed.	Replace defective thermocouple cable (Ref. 77-21-01, P. Block 401)
(b)Thermocouple Probes for :		
R 1 Stripped or damaged threads on alumel or chromel terminals.	50% of one entrance thread or 10% each of two entrance threads, provided high or displaced metal is removed.	Replace defective thermocouple probe (Ref. 77-21-04, P. Block 401)
R 2 Cracking, bending, denting, erosion, burning or bursting of probe.	Minor damage if its structural integrity is not impaired.	Replace defective thermocouple probe (Ref. 77-21-04, P. Block 401). If you see damage to the EGT probe (see NOTE 1), do borescope inspection of the LPT (Ref. 72-57-00, P. Block 601).
R 3 Loose or broken terminal ceramic.	None allowed.	Replace defective thermocouple probe (Ref. 77-21-04, P. Block 401)
R 4 Contamination or black deposits on terminal ceramic.	None allowed.	Replace defective thermocouple probe (Ref. 77-21-04, P. Block 401)
R 5 Prying or witness marks on probe mounting face.	None allowed.	Replace defective thermocouple probe (Ref. 77-21-04, P. Block 401)

	Insp/Check	Maximum Serviceable Limits	Remarks
R	6 Witness marks on probe support indicative of internal contact with engine hardware or handling damage.	None allowed.	Replace defective thermocouple probe (Ref. 77-21-04, P. Block 401)
R	7 Probe support is loose due to failed or worn internal spring.	None allowed.	Replace defective thermocouple probe (Ref. 77-21-04, P. Block 401)
	(c)Junction Box for :		
	1 Damaged or excessively worn connector socket pins.	None allowed.	Replace defective junction box per (Ref. 77-21-03, P. BLock 401)
	(d)Coupling Nuts for :		
	1 Stripped or damaged threads.	50% of one entrance thread or 10% each of two entrance threads, provided high or displaced metal is removed.	Repair by chasing threads or replace defective component.
	(e)Connectors for :		
	1 Stripped or damaged threads.	50% of one entrance thread or 10% each of two entrance threads, provided high or displaced metal is removed.	Repair by chasing threads or replace defective component.
	(f)Thermocouple probe insertion hole (located in LPT stator case) for :		
R	See CAUTION 1 and NOTE 2		
R	1 Obstruction by foreign matter (oxidization).	None allowed.	Repair by reaming insertion hole with a 0.281 in. (7.137 mm) to a 0.283 in. (7.188 mm) reamer. Ream the insertion hole to maximum depth of 2 in. (50.8 mm).

R NOTE 1 : (Ref. Fig. 601).
R CAUTION 1 : DO NOT REAM THE THERMOCOUPLE INSERTION HOLE TO A DEPTH
R MORE THAN 2.0 IN. (50.8 MM) OR DAMAGE TO THE LPT STATOR

VANES AND BLADES CAN OCCUR.

NOTE 2 : The insertion hole is found in the Low Pressure Turbine (LPT) case.

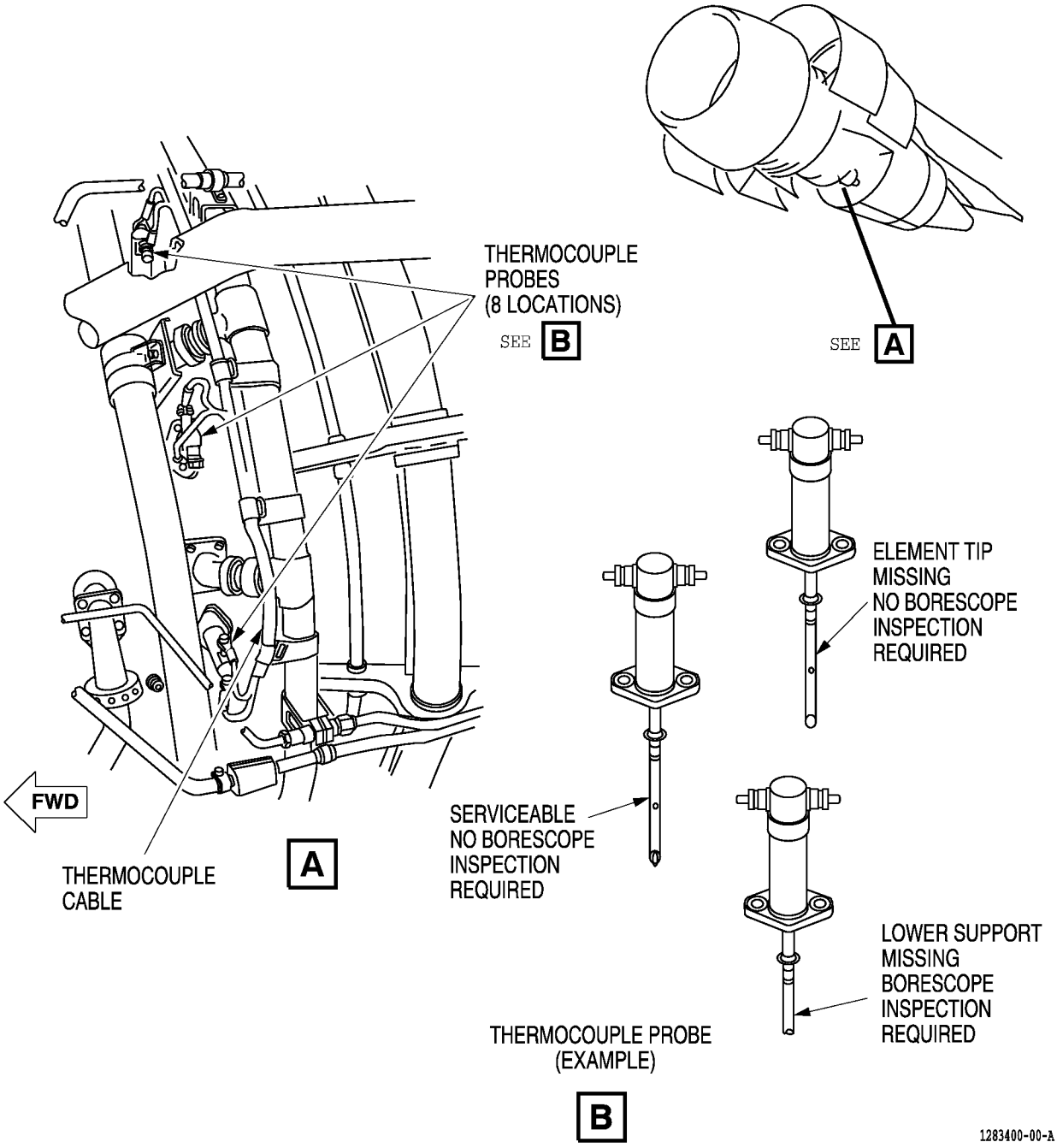
R (4)Install the EGT Thermocouple probes that were removed for inspection
R (Ref. 77-21-04, P. Block 401).

C. Close-Up

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2)Remove access platform.

(3)Remove safety clips and tags and close appropriate engine circuit breakers and circuit breakers 1EY, 2EY, close thrust reverser and core cowl doors (Ref. 71-13-00, P. Block 301).



BM5 77 21 00 6 LAM0 02

Requirements For a LPT Borescope Inspection
Figure 601

R

EGT THERMOCOUPLE HARNESS - REMOVAL/INSTALLATION

1. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Access Platform
C.	Torque Wrench 10-50 lbf.in.(0.113-0.565 m.daN)
R D. Material No. C02-053	Antiseize Compounds, Lubricants, Oils
R	(Ref. 70-00-00)
R E. Material No. C02-060	Antiseize Compounds, Lubricants, Oils
R	(Ref. 70-00-00)
R F. Material No. C04-035	Cleaning Compounds and Solvents
R	(Ref. 70-00-00)
Referenced Procedures	
- 71-00-00, P. Block 501	Power Plant
- 71-13-00, P. Block 301	Cowl Doors

2. Procedure

A. Job Set-Up

(1)Open, safety and tag the following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
133VU	ENGINES/ENG1/EGT	1EY	333/T73
133VU	ENGINES/ENG2/EGT	2EY	333/T74

(2)Open, safety and tag the appropriate circuit breakers and open fan, thrust reverser and core cowl doors (Ref. 71-13-00, P. Block 301).

(3)Install access platform.

B. Removal of Upper and/or Lower Thermocouple (T/C) Harness(es)
(Ref. Fig. 401, 403, 404)
(Ref. Fig. 405)

R CAUTION : DO NOT BEND OR TWIST THE THERMOCOUPLE CABLE WHEN YOU REMOVE
R OR INSTALL THE CABLE. IF YOU BEND OR TWIST THE CABLE YOU
R CAN CAUSE DAMAGE TO THE CABLE.
R CAUTION : DO NOT APPLY SIDE-LOADS TO THE THERMOCOUPLE HARNESS PIGTAIL
R LEADS WHEN YOU REMOVE THEM. THIS CAN CAUSE DAMAGE TO THE
R MAGNAFORM SLEEVES OR THERMOCOUPLE PROBE STUDS.

Pre SB GE77-025*** (T49 THERMOCOUPLE CABLE WITHOUT SPACERS ON ACTIVE CLEARANCE COOLING AIR TUBE BRACKETS)

(1)Remove bolts, washers, and nuts from cable D-rings that secure the upper and/or lower T/C harness(es) to the low pressure turbine cooling manifold and active clearance control manifold.
Assure that the spacer is installed between the EGT harness and the 7th stage cooling air manifold to prevent chafing of the EGT harness (Ref. Fig. 402) (Detail A).

End Pre SB GE77-025

Post SB GE77-025*** (T49 THERMOCOUPLE CABLE WITH SPACERS ON ACTIVE CLEARANCE COOLING AIR TUBE BRACKETS)

(1)Remove bolts, washers, spacers, and nuts from cable D-rings that secure the upper and/or lower T/C harness(es) to the low pressure turbine cooling manifold and active clearance control manifold.
Assure that the spacer is installed between the EGT harness and the 7th stage cooling air manifold to prevent chafing of the EGT harness (Ref. Fig. 402) (Detail A).

End Post SB GE77-025

CAUTION : BEFORE YOU REMOVE THE THERMOCOUPLE HARNESS CONNECTOR NUTS
R FROM THE EGT PROBE, PUT A SMALL AMOUNT OF COMPOUND ON THE ENDS OF THE EGT PROBE STUDS AND ON THE THREADS OF THE HARNESS CONNECTOR NUTS, OR DAMAGE TO THE EGT PROBE STUDS
R MAY OCCUR.

(2)Remove pigtail connector nuts from LPT thermocouple probe studs.
NOTE : Minor movement of the T/C harnesses may be necessary to ease removals.

(a)Apply a small amount of penetrating oil (Material No. C02-060 or C02-053) at the ends of the EGT probe studs and on the threads of the harness connector nut.

R (b)Disconnect the pigtail leads from the EGT thermocouple probe.
WARNING : ISOPROPYL ALCOHOL IS TOXIC AND FLAMMABLE. USE PERSONAL PROTECTION EQUIPMENT. USE IN A WELL-VENTILATED AREA.

(c)If penetrating oil (Material No. C02-060 or C02-053) is used to remove the harness connector nuts from the EGT thermocouple probe, clean the threaded surfaces with cotton swab or brush soaked with isopropyl alcohol (Material No.C04-035) and allow to air dry prior to reassembly.
NOTE : The EGT probe has two different stud diameters for the thermocouple lead connectors. The thermocouple cable lead connector nuts are captive nuts and part of the thermocouple cable leads.

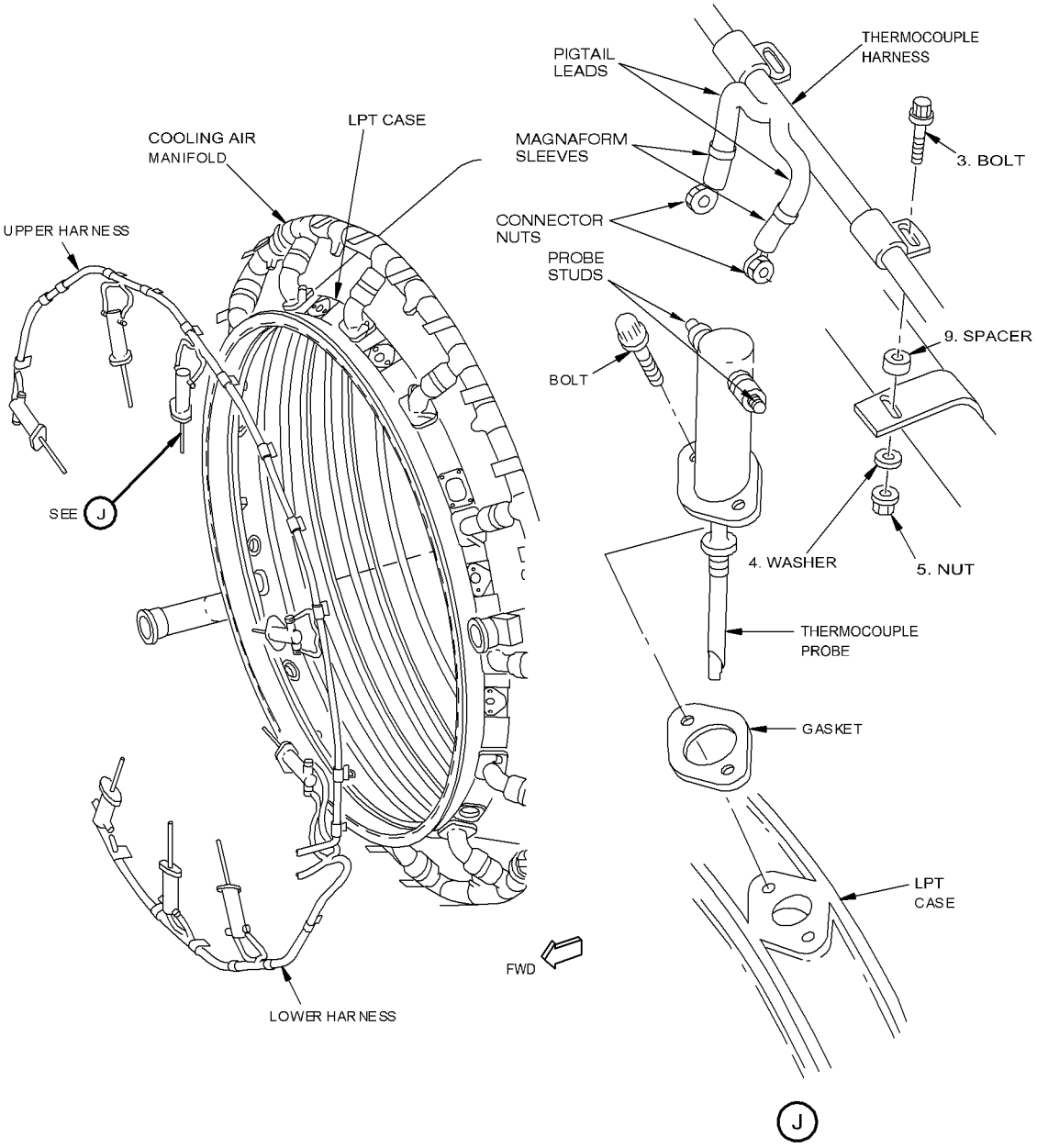
(3)Disconnect upper and/or lower T/C harness connector(s) at junction box.
(4)Carefully, remove lower and/or upper T/C harness(es) from around engine core.

C. Installation of Upper and/or Lower Thermocouple Cable(s).
(Ref. Fig. 401, 403, 404)
(Ref. Fig. 405)
CAUTION : DO NOT APPLY SIDE-LOADS TO THE THERMOCOUPLE CABLE PIGTAIL LEADS WHEN YOU INSTALL THEM. DAMAGE TO THE PROBE STUDS OR THE MAGNAFORM SLEEVES CAN OCCUR.

Pre SB GE77-025 *** (T49 THERMOCOUPLE CABLE WITHOUT SPACERS ON ACTIVE CLEARANCE COOLING AIR TUBE BRACKETS).

(1)Install the upper/lower thermocouple cables to the Active Clearance Control (ACC) cooling air tube with the cable D-rings, the bolts, the washers and the nuts. Do not tighten the nuts at this time.
Assure that the spacer is installed between the EGT harness and the 7th stage cooling air manifold to prevent chafing of the EGT harness.
(Ref. Fig. 402) (Detail A).

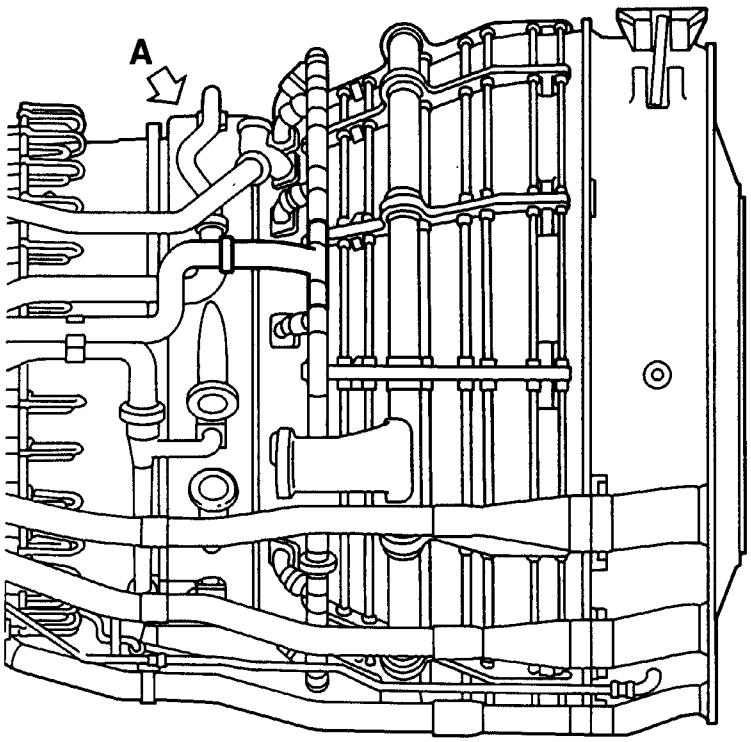
End Pre SB GE77-025

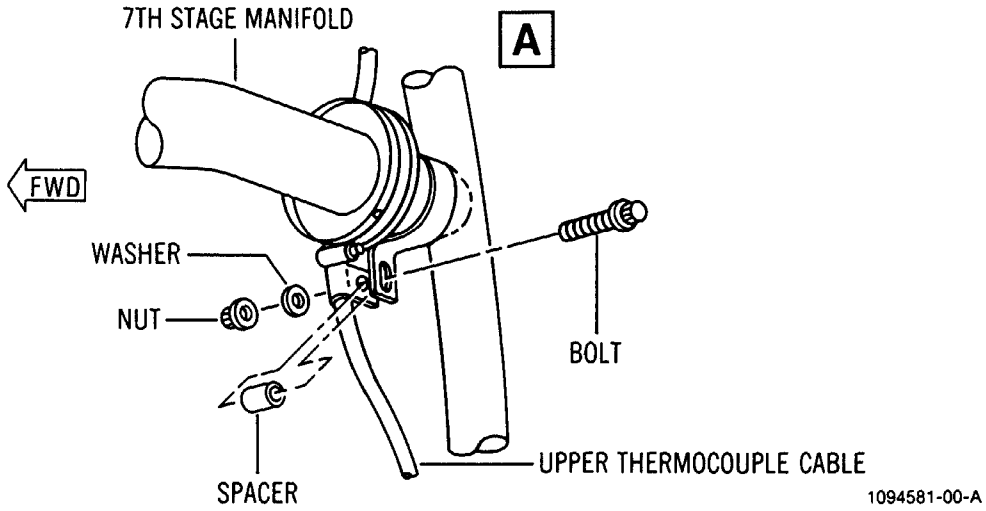


BM5 77 21 01 4 LAM0 01

Thermocouple Harness
Figure 401

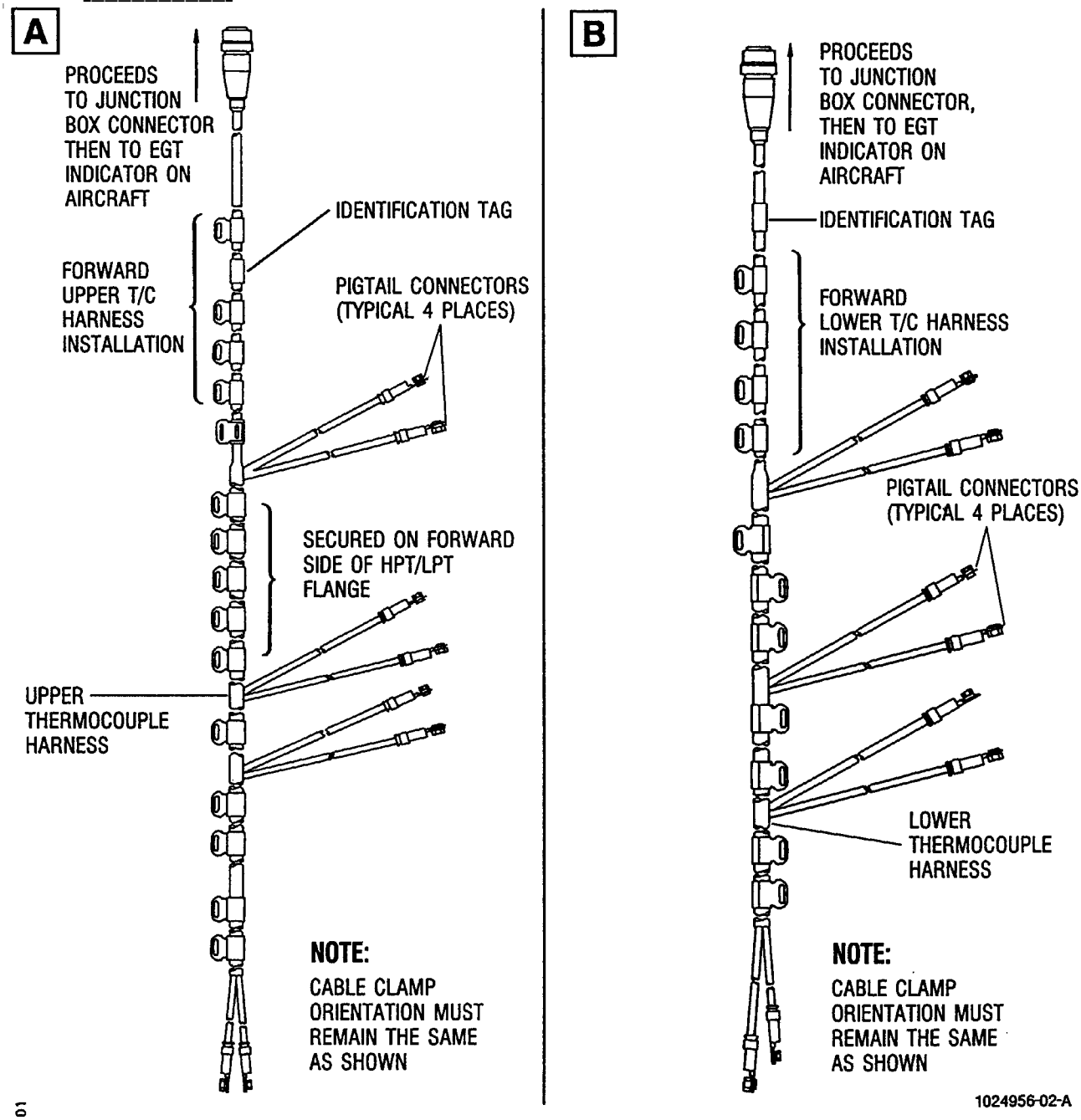
R





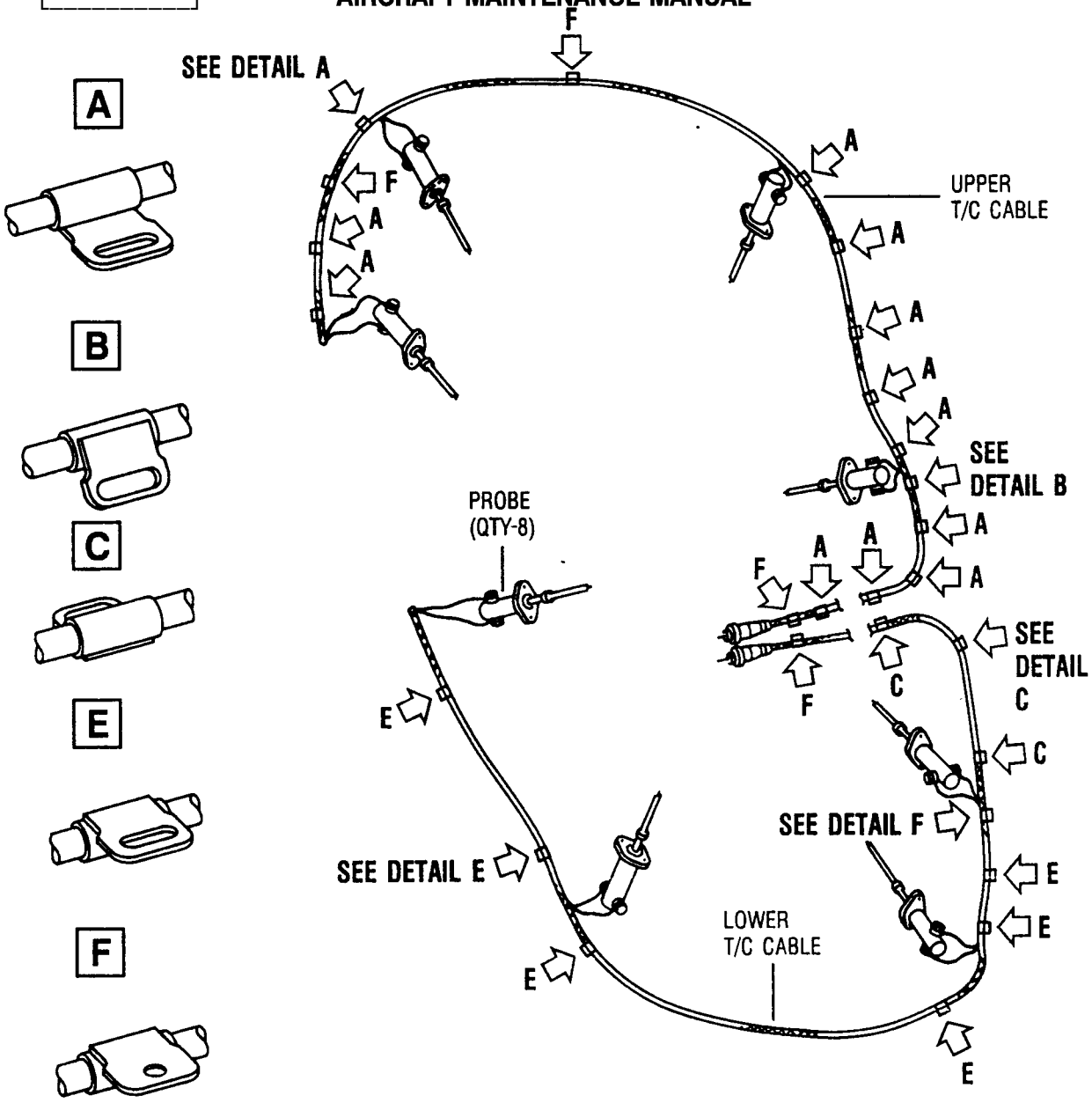
BMS 77 21 01 4 LBMO - 00

Thermocouple Harness
Figure 402


A
PROCEEDS TO JUNCTION BOX CONNECTOR THEN TO EGT INDICATOR ON AIRCRAFT
IDENTIFICATION TAG
FORWARD UPPER T/C HARNESS INSTALLATION
PIGTAIL CONNECTORS (TYPICAL 4 PLACES)
SECURED ON FORWARD SIDE OF HPT/LPT FLANGE
UPPER THERMOCOUPLE HARNESS
NOTE:
CABLE CLAMP ORIENTATION MUST REMAIN THE SAME AS SHOWN
B
PROCEEDS TO JUNCTION BOX CONNECTOR, THEN TO EGT INDICATOR ON AIRCRAFT
IDENTIFICATION TAG
FORWARD LOWER T/C HARNESS INSTALLATION
PIGTAIL CONNECTORS (TYPICAL 4 PLACES)
LOWER THERMOCOUPLE HARNESS
NOTE:
CABLE CLAMP ORIENTATION MUST REMAIN THE SAME AS SHOWN
1024956-02-A

BMS 77210 14 LCMO-01

Thermocouple Harness
Figure 403



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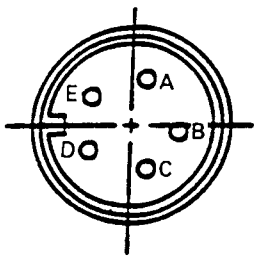
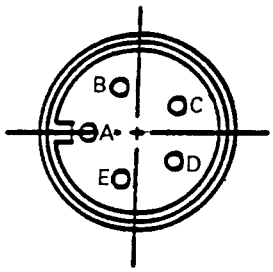
Thermocouple Harness
Figure 404



60 DEGREES HARNESS CONNECTOR



45 DEGREES HARNESS CONNECTOR

BMS 77 21 01 4 LGMO - 00

EGT Thermocouple Cable Installation
Figure 405

Post SB GE77-025 *** (T49 THERMOCOUPLE CABLE WITH SPACERS ON ACTIVE CLEARANCE COOLING AIR TUBE BRACKETS).

(1)Install the upper/lower thermocouple cables to the Active Clearance Control (ACC) cooling air tube with the cable D-rings, bolts, washers, spacers, and nuts. Do not tighten the nuts at this time. Assure that the spacer is installed between the EGT harness and the 7th stage cooling air manifold to prevent chafing of the EGT harness. (Ref. Fig. 402) (Detail A).

End Post SB GE77-025

CAUTION : DO NOT USE DIFFERENT CONFIGURATIONS OF EGT THERMOCOUPLE CABLES AND SHUNT JUNCTION BOXES. INCORRECT INSTALLATION OF THE EGT THERMOCOUPLE CABLE TO THE SHUNT JUNCTION BOX WILL CAUSE AN INCORRECT EGT INDICATION. YOU CAN DAMAGE THE HARDWARE IF YOU USE CONFIGURATIONS THAT ARE NOT THE SAME.

(2)Use the correct configuration of EGT thermocouple cable when you install the harness connector to the shunt junction box.

(3)Connect the upper/lower cable connectors to the electrical receptacles on the shunt junction box. Remove the excess slack between the connector and the first cable D-rings. Hand tighten the nuts at the first cable D-rings.

(4)Install the upper/lower thermocouple cables to the Low Pressure Turbine (LPT) cooling air manifold with the cable D-rings, the bolts, the spacer, the washers and the nuts. Do not tighten the nuts at this time.

NOTE : Make certain there is slack between the 2nd and the 5th D-rings on the upper thermocouple cable. The slack is critical between the 3rd and the 4th D-rings where the thermocouple cable goes from the ACC cooling air tube to the LPT cooling air manifold.

(5)Adjust the slack between the remaining D-rings on the upper/lower thermocouple cables. Make certain there is enough slack between the 11th and the 12th D-rings on the upper thermocouple cable. Hand tighten the nuts.

(6)Install the pigtail leads to the thermocouple probe studs :

CAUTION : BEFORE YOU TORQUE THE CONNECTOR NUTS, MAKE SURE THE THERMOCOUPLE PIGTAIL LEADS WILL NOT TOUCH OTHER ENGINE PARTS DURING ENGINE OPERATION OR DAMAGE TO THE THERMOCOUPLE CABLE CAN OCCUR.

CAUTION : DO NOT APPLY SIDE-LOADS TO THE THERMOCOUPLE CABLE PIGTAIL LEADS WHEN YOU INSTALL THEM. DAMAGE TO THE PROBE STUDS OR THE MAGNAFORM SLEEVES CAN OCCUR.

CAUTION : MAKE SURE YOU INSTALL THE CONNECTOR NUTS ONTO THE THERMOCOUPLE PROBE STUDS BY HAND BEFORE YOU TORQUE THE NUTS. OTHERWISE DAMAGE TO THE THREADS ON THE CONNECTOR NUTS OR THE PROBE STUDS CAN OCCUR.

CAUTION : DO NOT OVERTORQUE THE CONNECTOR NUTS WHEN YOU INSTALL THEM. DAMAGE TO THE CONNECTOR NUTS OR THE PROBE STUDS CAN OCCUR.

R CAUTION : TO MAINTAIN OUTPUT SIGNAL ACCURRACY, HARNESS CONNECTOR NUTS AND
R EGT THERMOCOUPLE PROBE STUDS SHOULD BE FREE OF OIL OR CONTAMI-
R NATION. OTHERWISE CONTAMINATION CAN RESULT IN A LOSS OF PROBE
R OUTPUT SIGNAL.

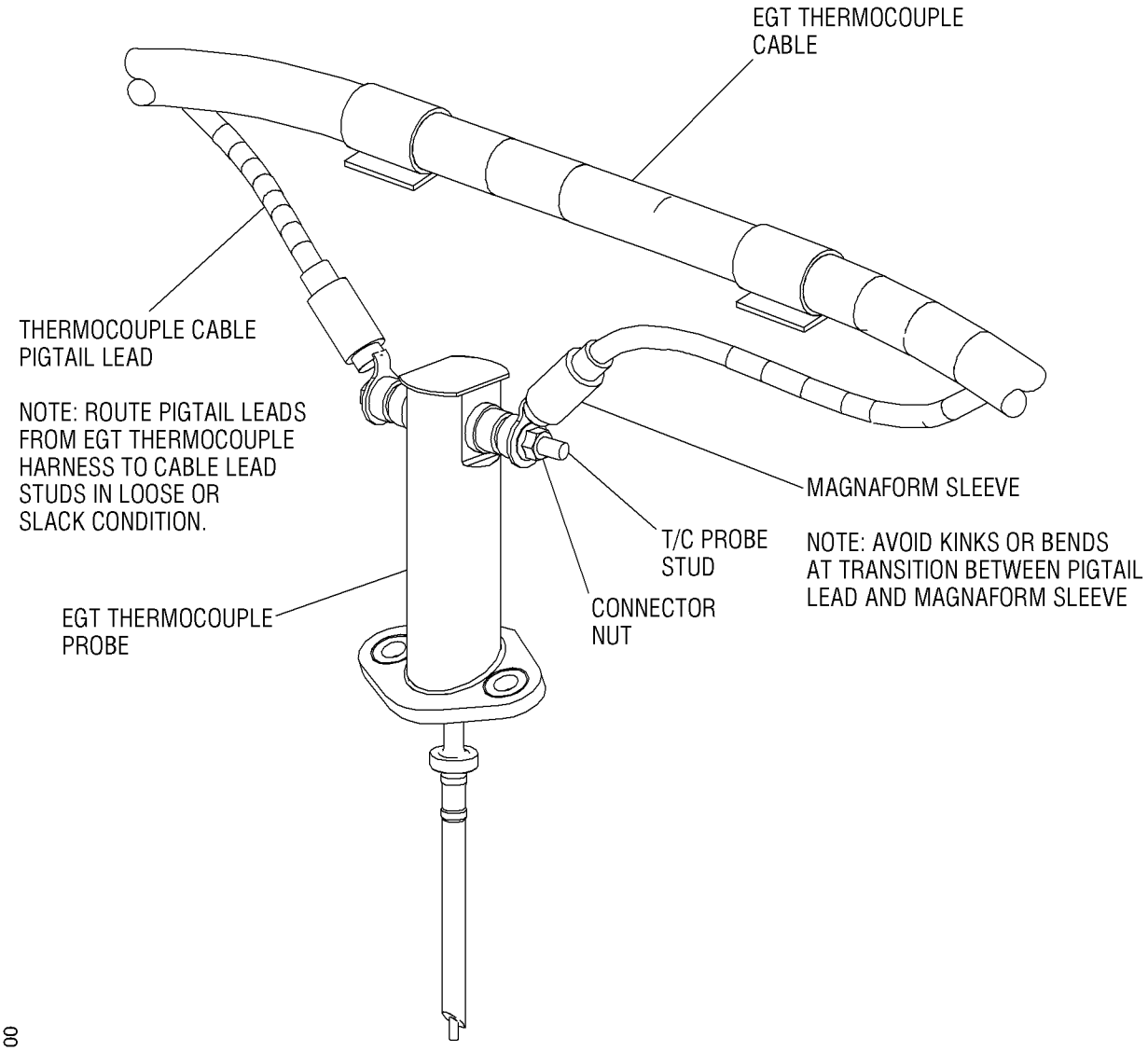
R (a)Connect the thermocouple cable pigtail leads to the thermocouple probe
R studs with the connector nuts as follows :

R 1 Attach the connector nuts with your hand.
R 2 Make sure the pigtail leads are routed in a smooth, continuous manner (Ref. Fig. 406).
R NOTE : The thermocouple probe studs have different diameters (thread dimensions). Each connector nut is the same dimension as its mating probe stud.
R 3 Tighten the thermocouple probe connector as follow :
R - TORQUE the smaller (chromel) connector nut to between 12 and 14 lbf.in. (0.14 and 0.16 m.daN).
R - TORQUE the larger (alumel) connector nut to between 20 and 30 lbf.in. (0.23 and 0.34 m.daN).
R - Make sure that all the thermocouple cable pigtail leads are connected to thermocouple probes and the probe nuts are tightened correctly.

(7)Make certain there are no sharp bends or kinks in the thermocouple cables. TORQUE the D-ring nuts to between 33 and 37 lbf.in. (0.37 and 0.42 m.daN) (Ref. Fig. 406).

D. Close-Up and Test

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Remove access platform.
(3)Close core, thrust reverser and fan cowl doors (Ref. 71-13-00, P. Block 301). Remove safety clips and tags and close related circuit breakers together with circuit breakers 1EY and 2EY.
(4)Perform test as indicated in "Type of testing after engine component replacement" (Ref. 71-00-00, P. Block 501).


EGT THERMOCOUPLE CABLE
THERMOCOUPLE CABLE PIGTAIL LEAD
NOTE: ROUTE PIGTAIL LEADS FROM EGT THERMOCOUPLE HARNESS TO CABLE LEAD STUDS IN LOOSE OR SLACK CONDITION.
MAGNAFORM SLEEVE
T/C PROBE STUD
NOTE: AVOID KINKS OR BENDS AT TRANSITION BETWEEN PIGTAIL LEAD AND MAGNAFORM SLEEVE
CONNECTOR NUT
EGT THERMOCOUPLE PROBE
BM5 77 21 01 4 LJM0 00
1255864-00

EGT Thermocouple Harness Preferred Routing
Figure 406

JUNCTION BOX - REMOVAL/INSTALLATION

1. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Corrosion Resistant Steel Lockwire
C.	Torque Wrench 0-50 lbf.in. (0-0.56 m.daN)
Referenced Procedure - 71-13-00, P. Block 301	Cowl Doors

2. Procedure

A. Job Set-Up
(1)Open, safety and tag the following circuit breakers :

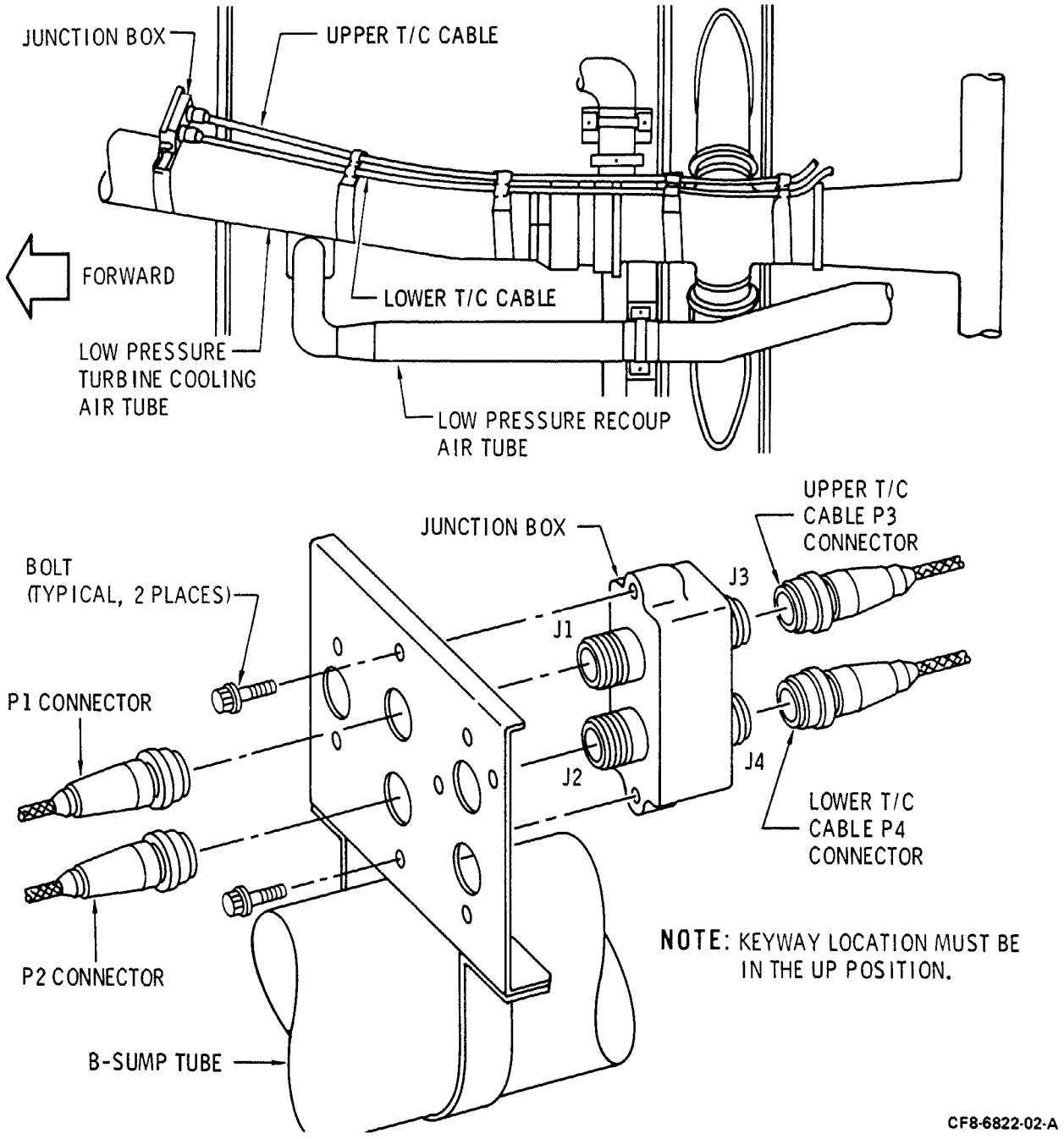
PANEL	SERVICE	IDENT.	LOCATION
133VU	ENG1/EGT	1EY	333/T73
133VU	ENG2/EGT	2EY	333/T74

(2)Open, safety and tag the circuit breakers for the appropriate engine and open fan and thrust reverser cowl doors (Ref. 71-13-00, P. Block 301).

B. Removal of Junction Box (Ref. Fig. 401, 402)
(1)Disconnect upper and lower thermocouple cable P3 and P4 connectors from junction box.
(2)Disconnect P1 and P2 connectors from junction box.
(3)Remove junction box by removing two bolts from the bracket assembly.
NOTE : Bracket assembly is secured to the B-Sump pressurization tube.

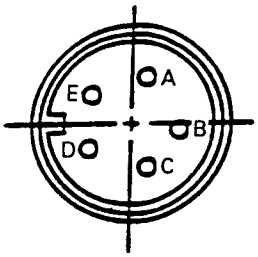
C. Installation of Junction Box (Ref. Fig. 401, 402)
CAUTION : DO NOT USE DIFFERENT CONFIGURATIONS OF EGT THERMOCOUPLE CABLES AND SHUNT JUNCTION BOXES. INCORRECT INSTALLATION OF THE EGT THERMOCOUPLE CABLE TO THE SHUNT JUNCTION BOX WILL CAUSE AN INCORRECT EGT INDICATION. YOU CAN DAMAGE THE HARDWARE IF YOU USE CONFIGURATIONS THAT ARE NOT THE SAME
(1)Use the correct configuration of EGT thermocouple cable when you install the harness connector to the shunt junction box.
(2)Secure junction box to bracket assembly with two bolts. TORQUE bolts to between 33 and 37 lbf.in. (0.37 and 0.42 m.daN).
NOTE : Keyway of connectors J3 and J4 must be pointing up.
(3)Secure P3 connector to J3 connector of junction box.
(4)Secure P4 connector to J4 connector of junction box.
(5)Secure P1 connector of upper T/C cable to J1 connector of junction box.
(6)Secure P2 connector of lower T/C cable to J2 connector of junction box.

D. Close-Up
(1)Make certain that working area is clean and clear of tools and

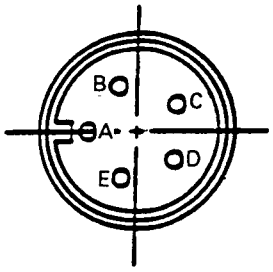


BM5 77 21 03 4 LAMO - 15 - 10
DM5

Junction Box
Figure 401



60 DEGREES HARNESS CONNECTOR



45 DEGREES HARNESS CONNECTOR

BM5 77 21 03 4 LCMO - 00

EGT Thermocouple Cable Installation
Figure 402

miscellaneous items of equipment.

(2)Remove safety clips and tags and close circuit breakers 1EY, 2EY.
Close thrust reverser and fan cowl doors (Ref. 71-13-00, P. Block 301).

THERMOCOUPLE PROBES - REMOVAL/INSTALLATION

1. General

The following procedure is used when removing or installing thermocouple probes.

The procedure is identical for any of the eight thermocouple probes installed circumferentially around the low pressure turbine stator case. Access is gained by opening the core cowl.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Corrosion Resistant Steel Lockwire
C.	Torque Wrench, 12-70 lbf. in. (0.14 - 0.79 m.daN)
D. 9429M49G01	EGT Thermocouple Probe Puller
E. Material No. C02-053	Antiseize Compounds, Lubricants, Oils (Ref. 70-00-00)
F. Material No. C02-058	Antiseize Compounds, Lubricants, Oils (Ref. 70-00-00)
G. Material No. C02-060	Antiseize Compounds, Lubricants, Oils (Ref. 70-00-00)
R H. Material No. C02-079	Antiseize Compounds, Lubricants, Oils (Ref. 70-00-00)
R I. Material No. C04-035	Cleaning Compounds and Solvents (Ref. 70-00-00)
R J. Material No. C10-071	Miscellaneous (Ref. 70-00-00)
Referenced Procedures	
- 71-00-00, P. Block 501	Power Plant - General
- 71-13-00, P. Block 301	Cowl Doors
- 72-57-00, P. Block 601	Low Pressure Turbine Rotor Assembly

3. Procedure

A. Job Set-Up

(1)Open, safety and tag the following circuit breakers

PANEL	SERVICE	IDENT.	LOCATION
133VU	ENGINES/ENG1/EGT	1EY	333/T73
133VU	ENGINES/ENG2/EGT	2EY	333/T74

(2)Open, safety and tag the circuit breakers for the appropriate engine and open core cowl doors (Ref. 71-13-00, P. Block 301).

B. Removal (Ref. Fig. 401, 402, 403)

CAUTION : EXCESSIVE SIDEWAYS FORCE ON THE EGT THERMOCOUPLE BODY WILL CAUSE
R PROBE SHAFT TO BIND IN THE LPT NOZZLE WHEN YOU REMOVE IT.

R REMOVE THE PROBE WITH A RADIAL, STRAIGHT OUT PULL, FORCE APPLIED TO PROBE HOUSING. USE TOOL FOR REMOVAL OF EGT
R THERMOCOUPLE PROBES, IF NECESSARY.

CAUTION : DO NOT BEND OR TWIST THE THERMOCOUPLE CABLE WHEN YOU REMOVE OR
R INSTALL THE CABLE. IF YOU BEND OR TWIST THE CABLE, YOU CAN CAUSE DAMAGE TO THE CABLE.

CAUTION : DO NOT APPLY SIDE-LOADS TO THE THERMOCOUPLE HARNESS PIGTAIL LEADS WHEN YOU REMOVE THEM. THIS CAN CAUSE DAMAGE TO THE MAGNAFORM SLEEVES OR THERMOCOUPLE PROBE STUDS.

CAUTION : BEFORE YOU REMOVE THE THERMOCOUPLE HARNESS CONNECTOR NUTS FROM THE EGT PROBE, PUT A SMALL AMOUNT OF PENETRATING OIL (MATERIAL No. C02-060 OR C02-053) ON THE ENDS OF THE EGT PROBE STUDS AND
R ON THE THREADS OF THE HARNESS CONNECTOR NUTS. IF NOT, DAMAGE
R TO THE EGT PROBE STUDS CAN OCCUR.

NOTE : There are four upper EGT thermocouple probes and four lower EGT thermocouple probes. Use this procedure to remove either an upper or a lower EGT probe.

(1)Apply a small amount of penetrating oil (Material No. C02-060 or C02-053) at the ends of the EGT probe studs and on the threads of the harness connector nut.

R (2)Remove the connector nuts and disconnect the pigtail leads from the
R thermocouple probe studs.

WARNING : ISOPROPYL ALCOHOL IS TOXIC AND FLAMMABLE. USE PERSONAL PROTECTION EQUIPMENT. USE IN A WELL-VENTILATED AREA.

(3)If penetrating oil (Material No. C02-060 or C02-053) is used to remove the harness connector nuts from the EGT thermocouple probe, clean the threaded surfaces with cotton swab or brush soaked with isopropyl alcohol (Material No. C04-035) and allow to air dry prior to reassembly.

NOTE : The EGT probe has two different stud diameters for the thermocouple lead connectors. The thermocouple cable lead connector nuts are captive nuts and part of the thermocouple cable leads.

CAUTION : APPLY A SMALL AMOUNT OF PENETRATING OIL (MATERIAL No. C02-060 OR C02-053) TO THE THERMOCOUPLE BOLTS BEFORE YOU REMOVE THEM OR DAMAGE TO THE LPT STATOR CASE CAN RESULT.

(4)Apply a small amount of penetrating oil (Material No. C02-060 or C02-053) to the two bolts that attach the EGT probe to the LPT stator case.

R (5)Remove the safety-wire (Material No. C10-071), and then remove the
R two bolts that attach the EGT thermocouple probe to the Low Pressure Turbine (LPT) case.

CAUTION : USE THE PROPER TOOLS TO REMOVE THE EGT THERMOCOUPLE PROBE. DO NOT PRY OR WIGGLE THE EGT THERMOCOUPLE PROBE TO REMOVE IT. DAMAGE TO THE EGT THERMOCOUPLE PROBE SUPPORT CAN OCCUR.

CAUTION : BE VERY CAREFUL WHEN YOU USE THE EGT THERMOCOUPLE PROBE PULLER TO REMOVE THE EGT THERMOCOUPLE PROBE. DAMAGE TO THE SURROUNDING TUBES AND BRACKETS CAN RESULT.

(6)Use hand pressure and carefully pull the EGT thermocouple probe radially outward from the mounting pad on the LPT case. If required, use the EGT thermocouple probe puller 9429M49G01 to remove the EGT thermocouple
R probe, as follows (Ref. Fig. 402) :

NOTE : It may be necessary to remove surrounding tubes and hardware to

gain access to the EGT thermocouple probe when using the EGT thermocouple probe puller.

(a)Remove the EGT thermocouple puller handle from the adapter. Turn the handle counterclockwise to remove the EGT thermocouple puller handle.

(b)Remove the finger clamps from the locking bracket. Turn the adapter counterclockwise until the finger clamps become free of the locking bracket.

(c)Put the finger clamps around the EGT thermocouple probe body. Make sure the finger clamps are placed below the brazed joint on the thermocouple probe housing.

NOTE : The brazed joint is located at the top of the thermocouple housing and below the probe studs.

(d)Put the locking bracket over the finger clamps. Make sure the threaded rod on the finger clamps enters the center hole in the locking bracket and that the locking bracket inner surface is aligned with the finger clamps outer surface. Turn the adapter clockwise to engage the threaded rod not less than 5 threads.

R (e)Turn the adapter clockwise by hand to pull the threaded stud on the finger clamps into the locking bracket. Turn the adapter until the finger clamps are pressed firmly against the EGT thermocouple probe.

(f)Use a wrench to tighten the adapter to a maximum torque of 165.0 lbf. in. (1.86 m.daN). Use the hexagon nut on adapter to tighten.

R CAUTION : HOLD THE EGT THERMOCOUPLE PROBE PULLER STABLE AT ALL TIMES DURING THE REMOVAL OF THE PROBE. DO NOT ALLOW THE EGT THERMOCOUPLE PROBE PULLER TO HANG ON THE EGT THERMOCOUPLE PROBE OR DAMAGE TO THE PROBE CAN RESULT.

(g)Install the handle of the EGT thermocouple probe puller 9429M49G01 into the adapter until hand tight.

(h)Pull the slide hammer away from the EGT thermocouple probe until it contacts the striking plate. Repeat step until the EGT thermocouple probe is free from the engine.

(i)Turn the adapter counterclockwise (CCW) to release the finger clamps from the EGT thermocouple probe. If necessary, use a wrench to loosen the adapter.

R (7)If you see damage to the probe (Ref. Fig. 404), do a borescope inspection of the LPT module (Ref. 72-57-00, P. Block 601) to make sure there is no damage to the LPT stator vanes or blades.

CAUTION : TO MAINTAIN OUTPUT SIGNAL ACCURRACY, HARNESS CONNECTOR NUTS AND EGT THERMOCOUPLE PROBE STUDS SHOULD BE FREE OF OIL OR CONTAMINATION. OTHERWISE CONTAMINATION CAN RESULT IN A LOSS OF PROBE OUTPUT SIGNAL.

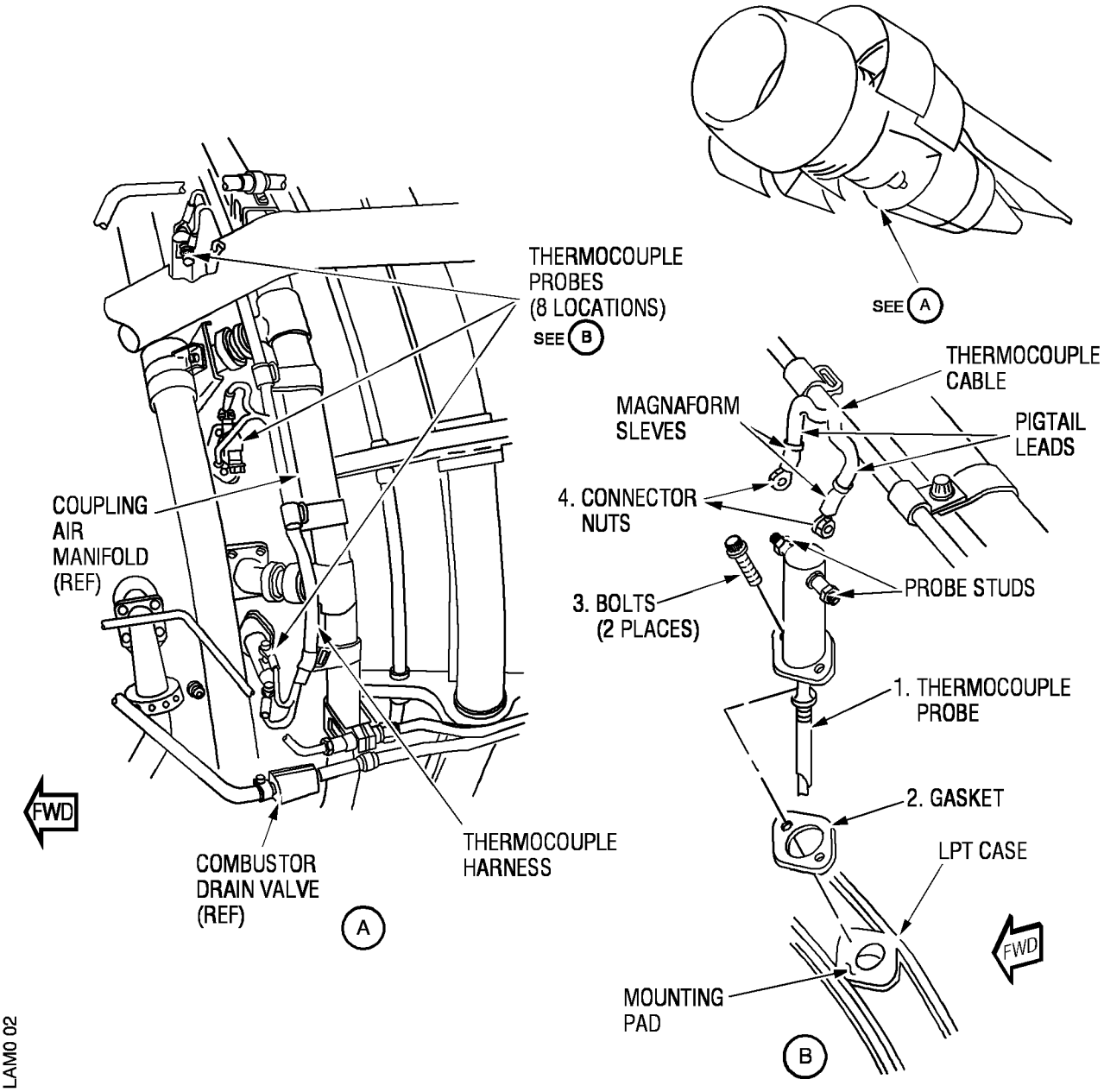
(8)Remove and discard the gasket (2) from the EGT thermocouple probe (1).

(9)Keep the parts you removed for the thermocouple probe installation.

C. Installation (Ref. Fig. 401, 403, 405)
(Ref. Fig. 406)

CAUTION : DO NOT REAM THE THERMOCOUPLE INSERTION HOLE TO A DEPTH MORE THAN 2.0 IN. (50.8 MM) OR DAMAGE TO THE LPT STATOR VANES AND BLADES CAN OCCUR.

NOTE : There are four upper EGT thermocouple probes and four lower EGT



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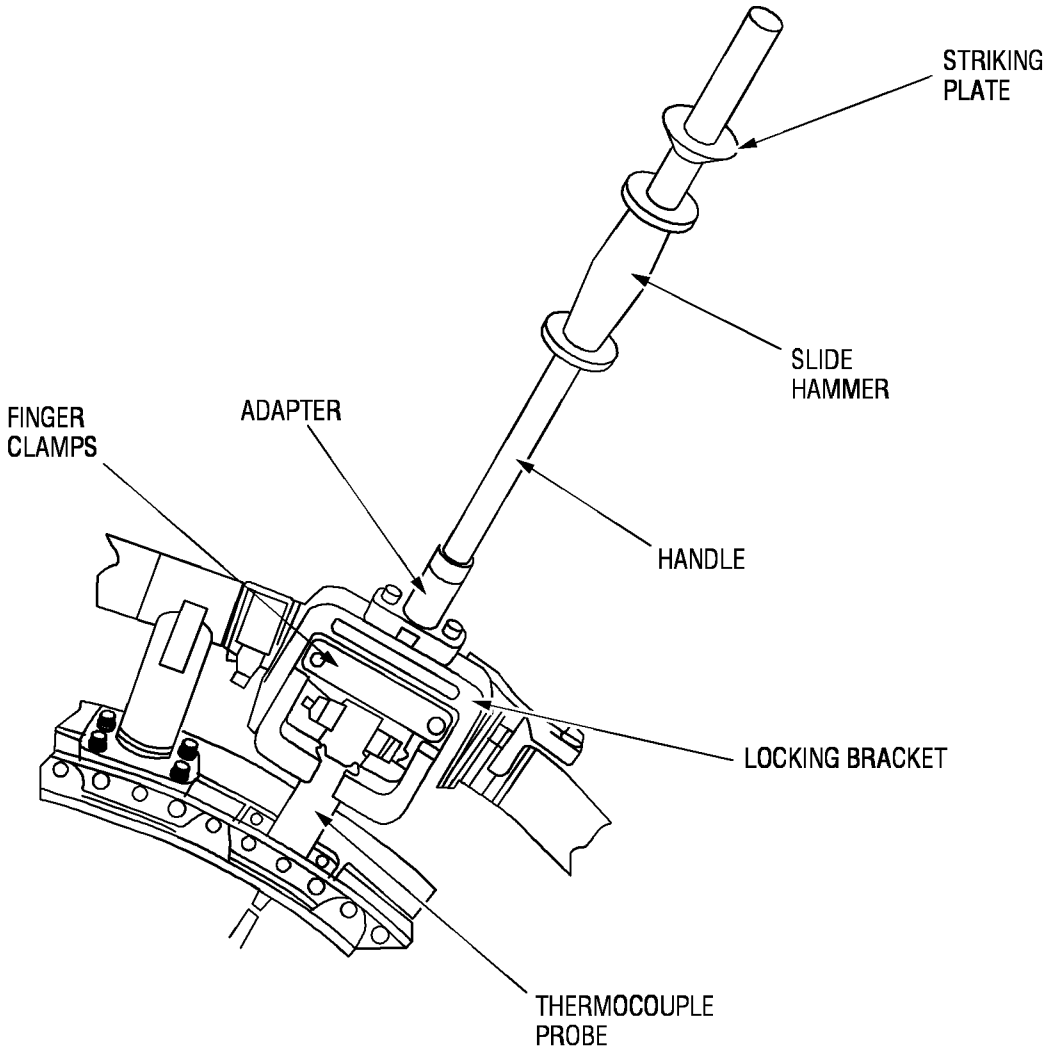
Thermocouples Probes Removal and Installation
Figure 401

R



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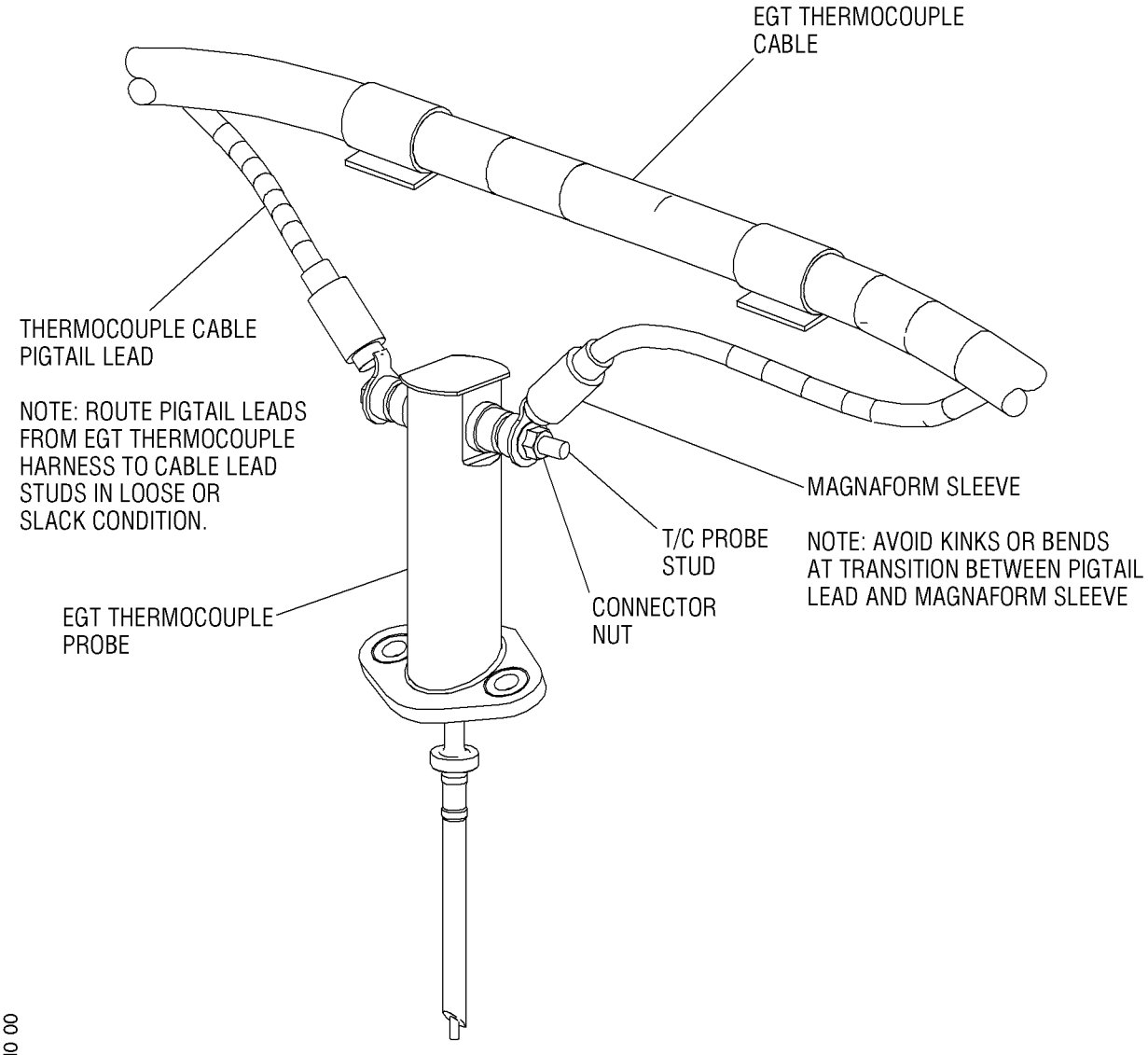
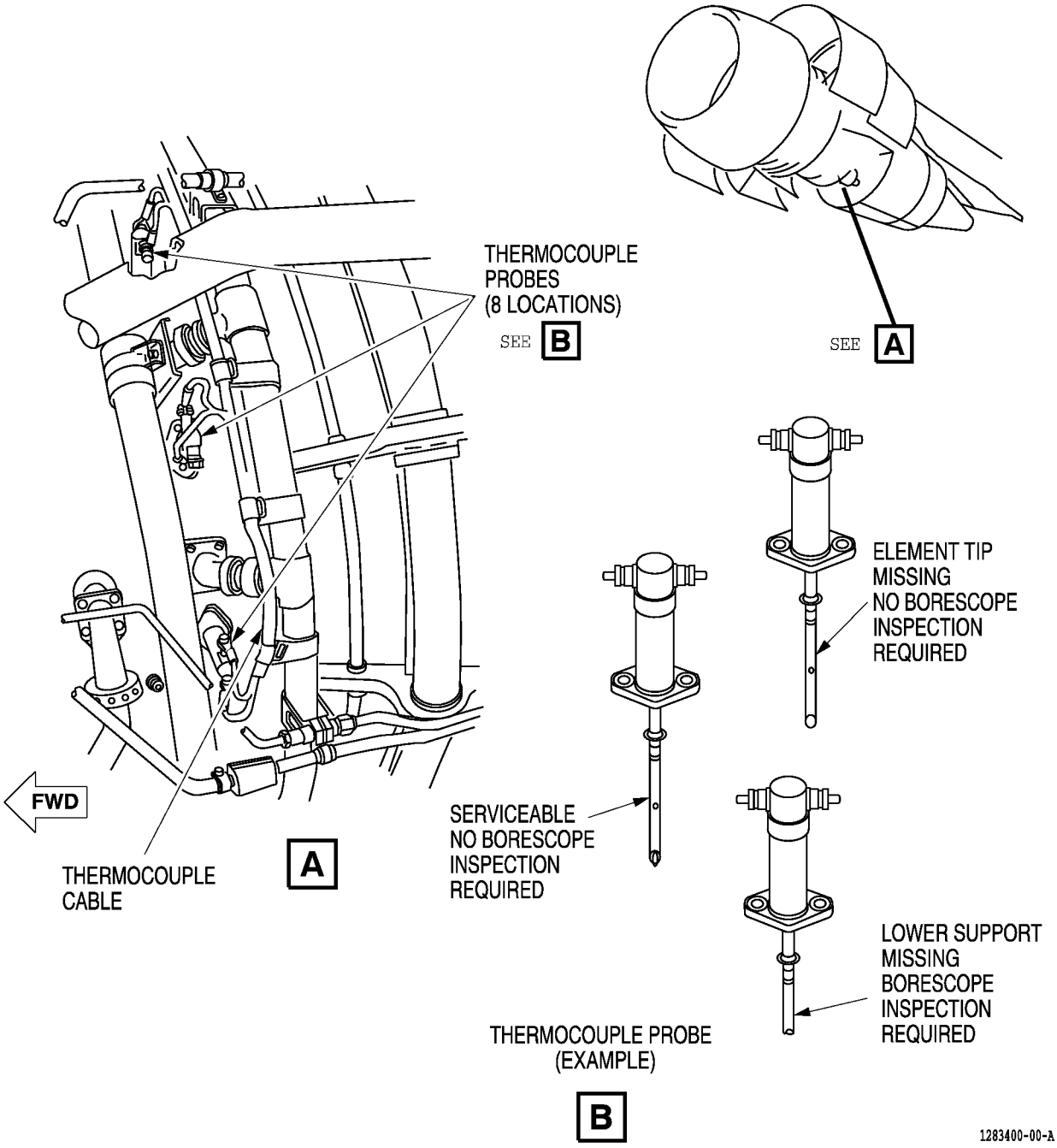
R Thermocouple Probes Puller
Figure 402


EGT THERMOCOUPLE CABLE
THERMOCOUPLE CABLE PIGTAIL LEAD
NOTE: ROUTE PIGTAIL LEADS FROM EGT THERMOCOUPLE HARNESS TO CABLE LEAD STUDS IN LOOSE OR SLACK CONDITION.
MAGNAFORM SLEEVE
T/C PROBE STUD
NOTE: AVOID KINKS OR BENDS AT TRANSITION BETWEEN PIGTAIL LEAD AND MAGNAFORM SLEEVE
EGT THERMOCOUPLE PROBE
CONNECTOR NUT
1255864-00

BM5 77 21 04 4 LEM0 00

Thermocouple Harness Pigtail Lead Preferred Routing
Figure 403

R



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Requirements for a LPT Borescope Inspection
Figure 404

R

thermocouple probes. Use this procedure to install either an upper or a lower EGT probe.

(1)Before you install the thermocouple probe, inspect the thermocouple probe insertion hole in the low pressure turbine (LPT) case for obstruction. If necessary, use a 0.281 in. (7.137 mm) to a 0.283 in. (7.188 mm) removal tool (reamer) to clean the hole of the blockage. Ream the insertion hole to maximum depth of 2.00 (50.8 mm).

(2)Apply a thin layer of the lubricant (Material No. C02-071) to the thermocouple probe support and collar at the interface to the LPT stage nozzle.

(3)Put a new gasket on the thermocouple probe.

CAUTION : MAKE SURE YOU INSTALL THE EGT THERMOCOUPLE PROBES WITH THE ARROW ON THE TOP OF THE PROBE POINTED TO THE FRONT OF THE ENGINE OR THAT THE FLANGE ON THE EGT PROBE IS ALIGNED WITH THE MOUNTING FLANGE ON THE LPT CASE. OTHERWISE DAMAGE TO THE PROBE CAN OCCUR.

(4)Carefully install the EGT thermocouple probe into the mounting pad on the LPT case. Inspect the EGT thermocouple probe for proper insertion. With the shaft seated, the probe flange should be approximately 0.33 in. (8.4 mm) from the LPT case (Ref. Fig. 406).

(a)Replace the EGT probe if the probe flange rests on the mounting pad of the LPT case or the distance is greater than 0.50 in. (12.7 mm) and the LPT stage 1 nozzle insertion hole had been cleaned per step 3.C.(1) above.

(5)Lubricate the threads of the two bolts with a layer of antiseize compound (Material No. C02-071, C02-058, or C02-079).

NOTE : Material No. C02-079 is an alternate for C02-058 for threaded fasteners 0.250 in. diameter and greater.

(6)Install the two bolts that secure the EGT thermocouple probe to the LPT case.

(7)TORQUE the two bolts to between 55 and 70 lbf. in. (0.62 and 0.79 m.daN). Safety the bolts with lockwire (Material No. C10-071).

CAUTION : DO NOT APPLY SIDE-LOADS ON THE T/C LEAD CONNECTOR NUT DURING INSTALLATION. DAMAGE TO THE THERMOCOUPLE TERMINALS OR THE MAGNAFORM SLEEVE CAN OCCUR.

CAUTION : BEFORE YOU TORQUE THE CONNECTOR NUTS, MAKE SURE THAT THE THERMOCOUPLE PIGTAIL LEADS WILL NOT TOUCH OTHER ENGINE PARTS DURING ENGINE OPERATION OR DAMAGE TO THE THERMOCOUPLE HARNESS CAN OCCUR.

CAUTION : MAKE SURE THAT YOU INSTALL THE CONNECTOR NUTS ON THE THERMOCOUPLE PROBE STUDS BY HAND BEFORE YOU TORQUE THE NUTS. OTHERWISE, DAMAGE TO THE THREADS ON THE CONNECTOR NUTS OR THE PROBE STUDS CAN OCCUR.

CAUTION : DO NOT TORQUE MORE THAN NECESSARY THE CONNECTOR NUTS WHEN YOU INSTALL THEM. THIS CAN CAUSE DAMAGE TO THE PIGTAIL LEADS, CONNECTOR NUTS, OR THE THERMOCOUPLE PROBE STUDS.

CAUTION : TO MAINTAIN OUTPUT SIGNAL ACCURRACY, HARNESS CONNECTOR NUTS AND EGT THERMOCOUPLE PROBE STUDS SHOULD BE FREE OF OIL OR
R CONTAMINATION. IF NOT, CONTAMINATION CAN CAUSE IN A LOSS OF PROBE OUTPUT SIGNAL.

CAUTION : AVOID BENDING OR KINKS IN THE THERMOCOUPLE HARNESS OR PIGTAILS

AS ROUTED ONTO THE THERMOCOUPLE PROBE STUDS. DAMAGE TO THE THERMOCOUPLE HARNESS CAN OCCUR.

(8)Position terminal onto stud, so that at final torques, excessive bending is avoided where the pigtail joins the terminal.

(9)Attach the pigtail lead with the small connector nut to the probe stud on the EGT thermocouple probe.

NOTE : The probe has two different diameter stud dimensions. The two cable connectors are different diameters to prevent incorrect installation of the cable leads.

(10)TORQUE the small connector nut to between 12 and 14 lbf. in. (0.14 and 0.16 m.daN).

(11)Attach the pigtail lead with the larger connector nut to the probe stud on the EGT thermocouple probe.

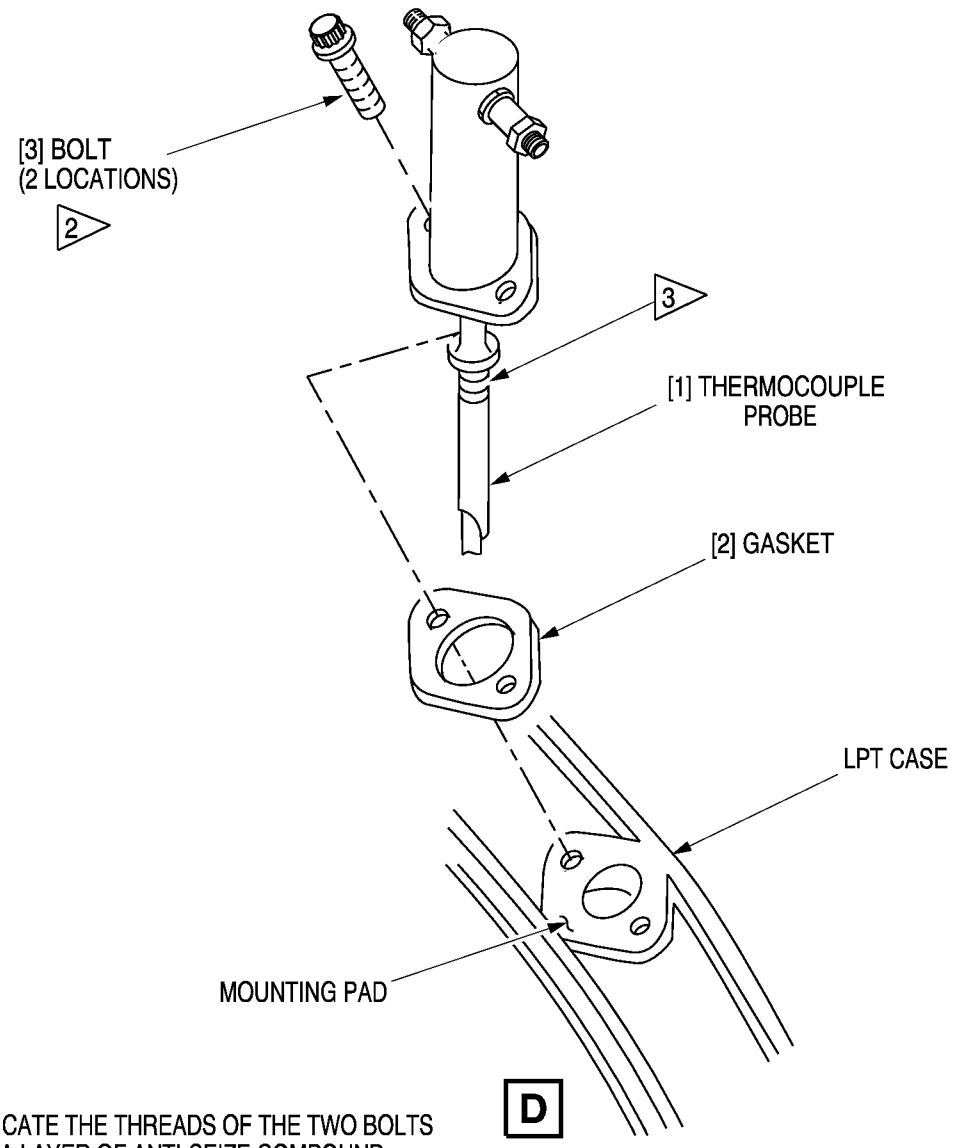
(12)TORQUE the larger connector nut to between 20 and 30 lbf. in. (0.23 and 0.34 m.daN).

D. Close-Up and Test

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2)Remove safety clips and tags and close circuit breakers 1EY, 2EY; close thrust reverser and core cowl doors (Ref. 71-13-00, P. Block 301).

(3)Perform test as indicated in "Type of Testing After Engine Component Replacement" (Ref. 71-00-00, P. Block 501).



2 LUBRICATE THE THREADS OF THE TWO BOLTS WITH A LAYER OF ANTI-SEIZE COMPOUND.

3 APPLY LUBRICANT ONTO THE THERMOCOUPLE PROBE SUPPORT AND COLLAR IN THIS LOCATION.

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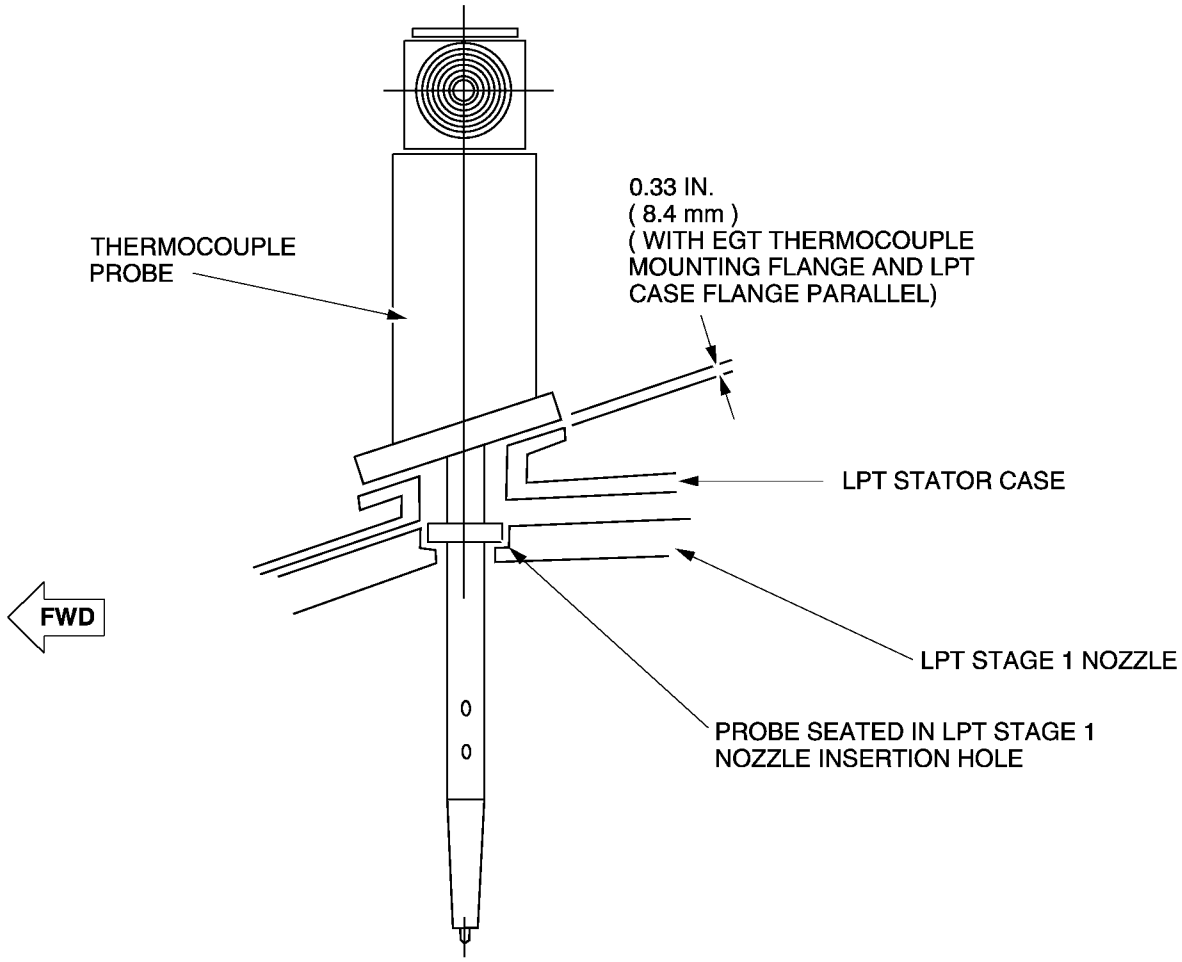
Thermocouple Probes Lubricant Apply Locations
Figure 405

R



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Measurement of the Thermocouple
Probe Insertion
Figure 406

R

EGT INDICATOR - REMOVAL/INSTALLATION

NOTE : Removal/Installation procedures for EGT indicators of L and R engines are identical.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Blanking Caps/Plugs
Referenced Procedure - 24-41-00, P. Block 301	AC External Power Control

2. Procedure

A. Job Set-Up

(1)Open, safety and tag the following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
133VU	ENGINES/ENG1 EGT	1EY	333/T73
133VU	ENGINES/ENG2 EGT	2EY	333/T74
133VU	ENGINES/ENG1 & 2 IND MAX POINTER RESET	1ER	332/U71

B. Removal

(Ref. Fig. 401)

(1)On face of panel 4VU, remove two screws (1) attaching EGT indicator.

(2)Remove EGT indicator (3) from panel 4VU.

(3)Disconnect EGT indicator and blank off plug and receptacle (2).

C. Installation

(1)Check housing of EGT indicator on panel 4VU.

(2)Remove blanking caps from plug and receptacle (2) and connect plug.

(3)Install EGT indicator (3) in panel 4VU.

(4)Attach EGT indicator (3) to panel 4VU with two screws (1).

(5)Remove safety clips and tags and close circuit breakers 1EY, 2EY and 1ER.

D. Test

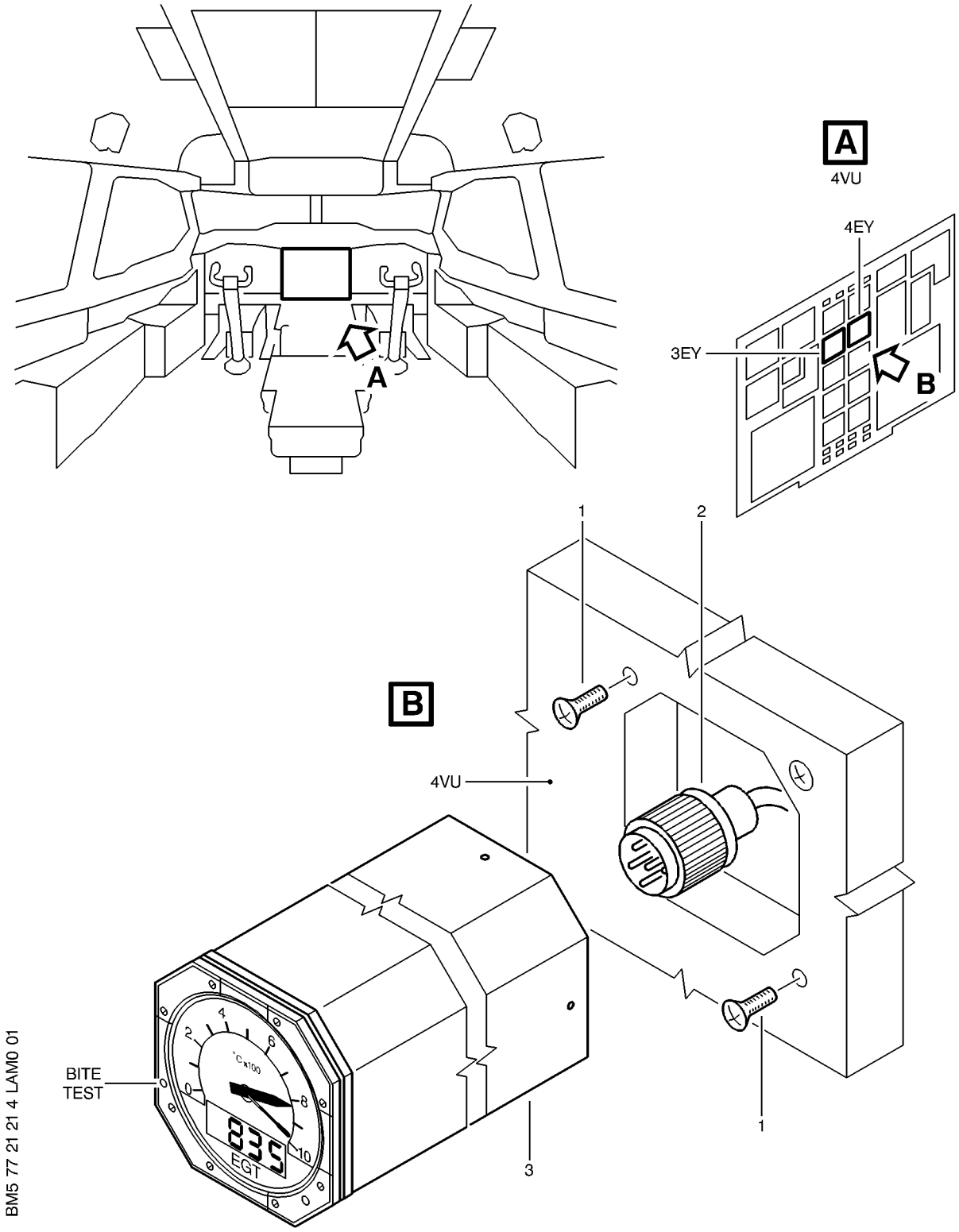
(1)Connect electrical ground power unit (Ref. 24-41-00, P. Block 301).

(2)Make certain that electrical supply is correct (28VDC, 115VAC, 26VAC).

ACTION	RESULT
(1)On panel 4VU - maintain slot of BITE screw R or Press-To-Test button, located in LH lower section of EGT indicator 3EY (4EY) in S R position or pressed in, R respectively.	On EGT indicator 3EY (4EY) - the main pointer indicates 975° ± 10°C (the main pointer aligns with the blue mark). - the digital counter indicates 975°C ± 7°C. - amber overtemperature warning light

ACTION	RESULT
- release BITE screw from S position or release Press-To-Test button.	comes on. - the main pointer returns to 0°C position. - the maximum indicating pointer remains in front of the blue mark. - amber overtemperature warning light goes off.
(2)On panel 472VU - press ENG/IND MAX/POINTER/ RESET pushbutton switch	On panel 4VU, EGT indicator 3EY (4EY) - the maximum indicating pointer returns in front of the red mark.

E. Close-up
(1)De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, P. Block 301).
(2)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(3)Restore aircraft systems to normal operating condition.



EGT Indicator
Figure 401

R

ENGINE AIDS - DESCRIPTION AND OPERATION

1. General (Ref. Fig. 001)

NOTE : This description deals only with engines on which the PMUX is installed.

A PMUX (propulsion multiplexer) has been installed at 10 o'clock on the aft fan case to check engine for correct operation.

The PMUX is shock mounted for vibration isolation and cooled by a flow of nacelle ambient air.

The PMUX receives analog data from the engine parameters and digital data from the PMC (busbar). These data are stored and transformed before being transmitted to the AIDS.

2. PMUX Inlet Parameters

The PMUX is supplied with 28VDC.

It receives :

A. In the Analog Form :

(1)Pneumatic signals from PS3, P25, PS14 and Pt49 pick up transducers.

(2)Electrical signals from T3, T25, T5 and EGT chromel/alumel thermocouple probes.

(3)Pulses from the N2 speed sensor and flowmeter transmitter.

(4)Signals transmitted by resolvers from the VSVs and VBVs.

(5)An engine identification signal.

B. In the Digital Form :

The message from the PMC.

The PMUX extracts from this message, the N1 command, N1 actual, P0 , T2, TLA, N1 DMD, power supply delivered to the MEC torque motor, ΔN1 (N1 command - N1 actual), N1 corrected (after PMC integrator), N1K.

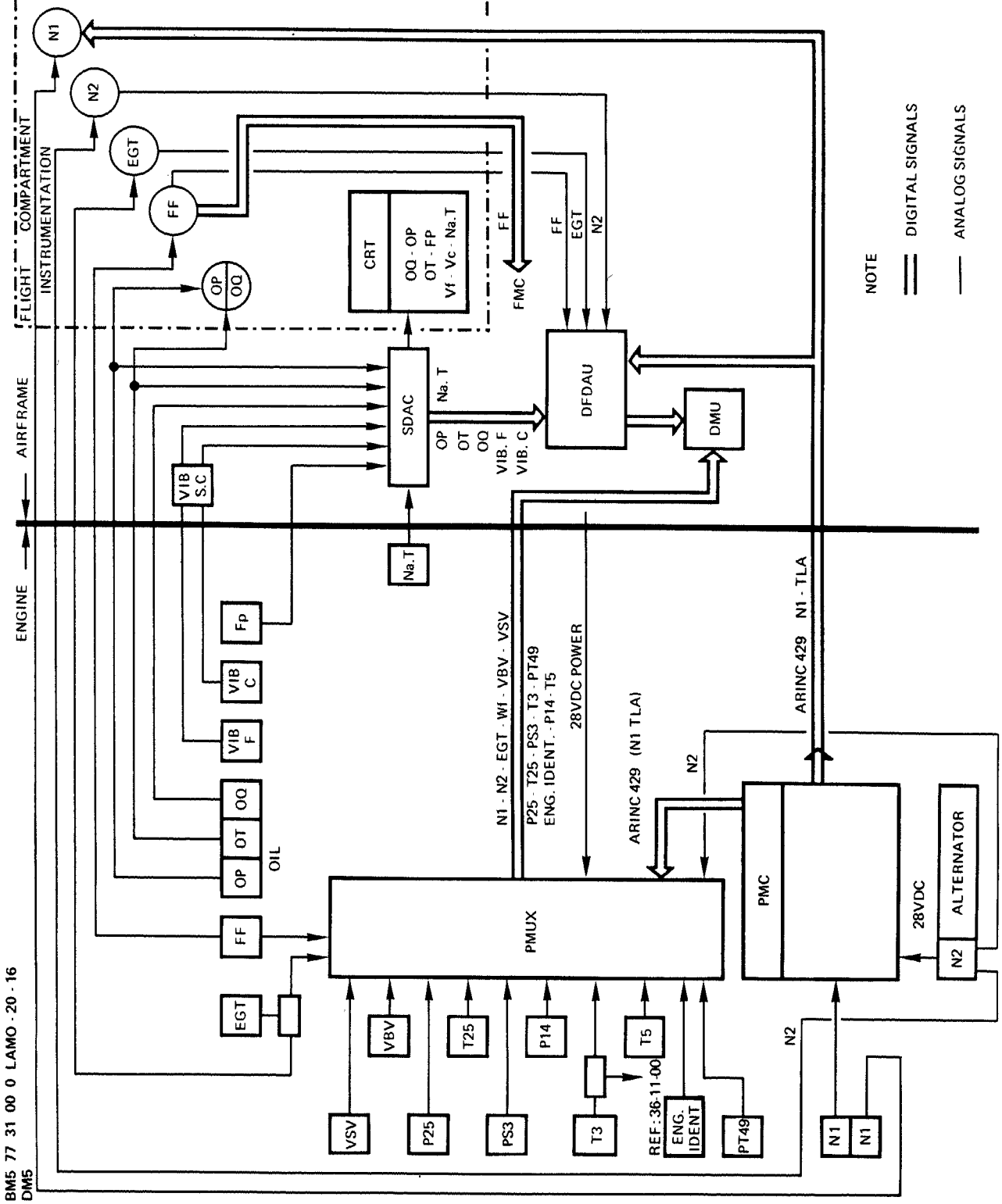
3. PMUX Data Processing

The input signals are conditioned and multiplexed before being transmitted in the ARINC 429 message format to the AIDS.

The PMUX features an internal self monitoring of the parameters, and the faults detected are identified and stored. After the flight, the maintenance personnel can read the stored faults by means of a special test wiring.

4. PMUX Output Parameters

After processing, all data are transmitted to the DMU (Data Management Unit) for storage (Ref. ATA 31).



Engine Parameters With PMUX
Figure 001

P49 PRESSURE PROBE - REMOVAL/INSTALLATION

1. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B. Material No.C02-002	Anti-Seize Compounds, Lubricants, Oils (Ref. 70-00-00)
C.	Caps
D.	Gasket
E.	Corrosion - Resistant Steel Lockwire
F	Torque Wrench 55-300 lbf.in.(0.62-3.39 m.daN)
Referenced Procedure - 71-13-00, P. Block 301	Cowl Doors

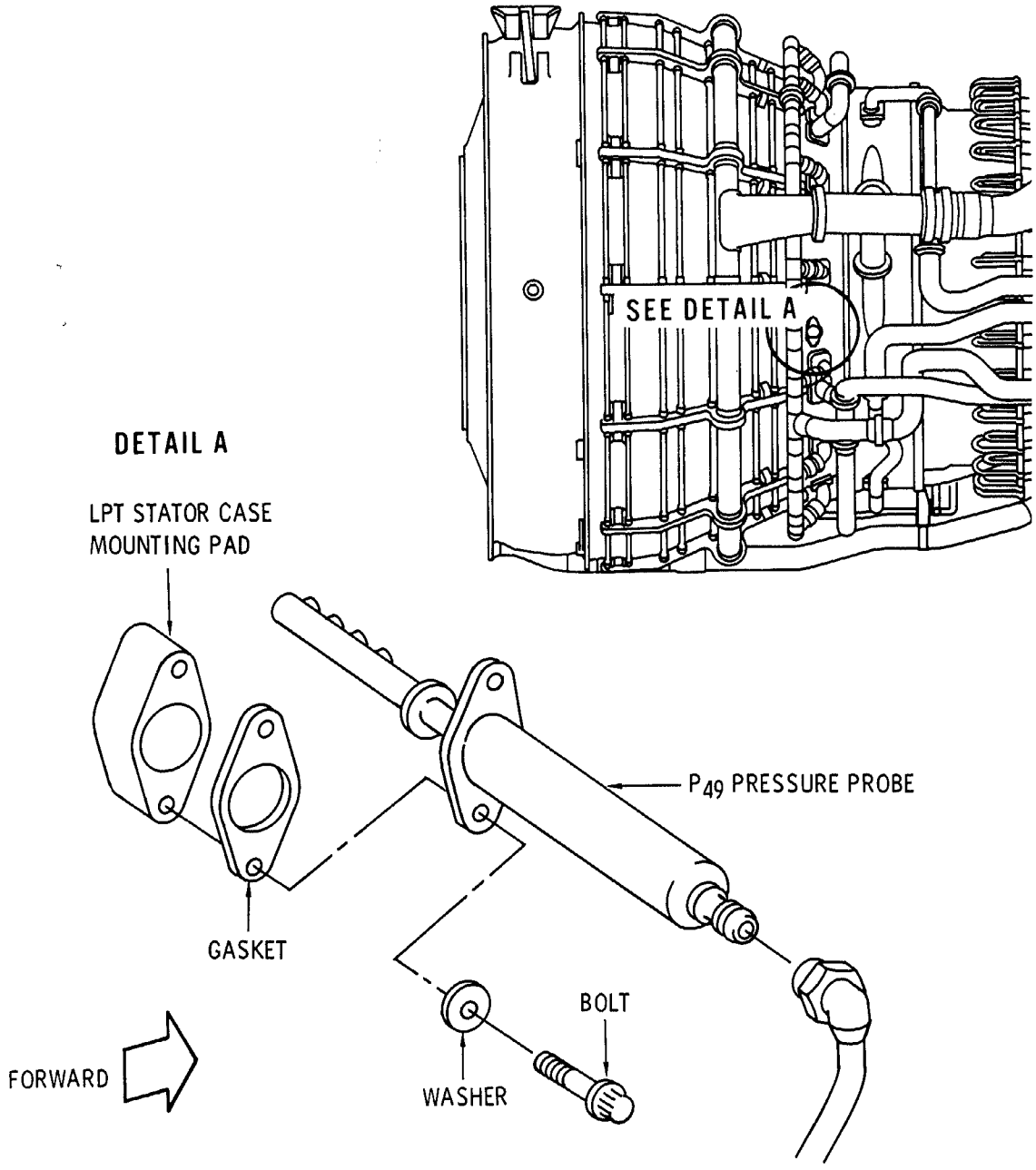
2. Procedure

A. Job Set-Up
(1)Open, safety and tag the appropriate circuit breakers and open right fan, thrust reverser and core cowl door (Ref. 71-13-00, P. Block 301).

B. Removal (Ref. Fig. 401)
(1)Disconnect air tube from probe.
(2)Install protective caps on probe and air tube.
(3)Cut and remove lockwire. Remove the 2 bolts and washers which secure probe to low pressure turbine (LPT) stator case.
CAUTION : USE CARE IN REMOVAL AND HANDLING OF PROBE. DO NOT DAMAGE ORIFICE INLETS OR BEND PROBE.
(4)Carefully pull probe out of its port in the LPT case.
(5)Remove and discard gasket.

C. Installation (Ref. Fig. 401)
(1)Place gasket in position on LPT stator case mounting pad.
CAUTION : USE CARE IN INSTALLATION OF PROBE. DO NOT DAMAGE ORIFICE INLETS OR BEND PROBE.
(2)Carefully insert probe into LPT stator case port. Make certain that probe sensing holes face forward.
(3)Lightly coat threads of bolts with C02-002 lubricant.
(4)Secure probe to frame. TORQUE bolts to 55 - 70 lbf. in. (0.62 - 0.79 m.daN). Wirelock.
(5)Remove protective caps from probe and air tube.
(6)Connect air tube to probe and TORQUE B-nut to between 270 and 300 lbf.in. (3.05 and 3.39 m.daN).

D. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close right core, thrust reverser and fan cowl doors (Ref. 71-13-00, P. Block 301). Remove safety clips and tags and close circuit breakers.



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DM5

P49 Pressure Probe
Figure 401

P49 PRESSURE PROBE - INSPECTION/CHECK

Inspection/Check

1. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
Referenced Procedures	
- 71-13-00, P. Block 301	Cowl Doors
- 77-31-02, P. Block 401	P49 Pressure Probe

2. Procedure

A. Job Set-Up
(1)Open, safety and tag the appropriate circuit breakers and open right fan, thrust reverser and core cowl doors (Ref. 71-13-00, P. Block 301).
(2)Remove P49 pressure probe (Ref. 77-31-02, P. Block 401).

B. Visually Inspect the Following :

INSPECT/CHECK	MAXIMUM SERVICEABLE LIMITS	REMARKS
(1)Mounting Flange for :		
(a)Cracks	None allowed	Replace probe
(b)Dents	Any amount provided probe still seats properly	Replace probe
(2)Housing for		
(a)Cracks	None allowed	Replace probe
(b)Dents	None allowed	Replace probe
(3)Orifices for :		
(a)Deformation	0.60 in. (1.52 mm) diameter	Replace probe
(b)Clogged passages	Not allowed	Clean

C. Close-Up
(1)Install P49 pressure probe (Ref. 77-31-02, P. Block 401).
(2)Remove safety clips and tags and close circuit breakers, close right fan, thrust reverser and core cowl doors (Ref. 71-13-00, P. Block 301).

T5 CORE EXHAUST TEMPERATURE SENSOR - REMOVAL/INSTALLATION

1. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Corrosion Resistant Steel Lockwire
C.	Torque Wrench 10 - 80 lbf.in. (0.11 - 0.90 m.daN)
D.	Access Platform
E.	Gasket
Referenced Procedure - 71-13-00, P. Block 301	Cowl Doors

2. Procedure

A. Job Set-Up
(1)Open the following circuit breaker :

PANEL	SERVICE	IDENT.	LOCATION
21VU	AIDS PMUX	12TU	105/EGS

(2)Open, safety and tag the circuit breakers for the appropriate engine and open left fan, thrust reversers and core cowl door (Ref. 71-13-00, P. Block 301).
(3)Install access platform.

B. Removal (Ref. Fig. 401)
(1)Disconnect electrical leads. Loosen captive nuts, one turn at a time, until harness is loose.
(2)Remove bolts, washers and nuts.
(3)Carefully remove sensor from port in turbine rear frame (TRF).
(4)Remove and discard gasket.

C. Installation (Ref. Fig. 401)
(1)Place new gasket on turbine rear frame mounting pad.
(2)Carefully insert T5 sensor into port.
(3)Install four bolts, washers, and nuts and TORQUE to between 55 and 70 lbf.in. (0.62 and 0.79 m.daN).
(4)Install the electrical leads on the probe studs with two different size captive nuts to make sure of correct installation. An alternate wrenching method is to be used.
(a)Start both nuts on the lead-in thread for each stud.
(b)Alternate wrenching each nut, one turn at a time, until you make contact with the stud faces.
CAUTION : BE CAREFUL WHEN YOU TIGHTEN THE NUTS ON THE STUDS. DAMAGE TO THE STUDS, THREADS, OR CERAMICS CAN OCCUR. AVOID TOO MUCH SIDE LOADING DURING INSTALLATION AND TORQUEING PROCESS.
(c)TORQUE the small nut to between 12 and 14 lbf.in. (0.14 and

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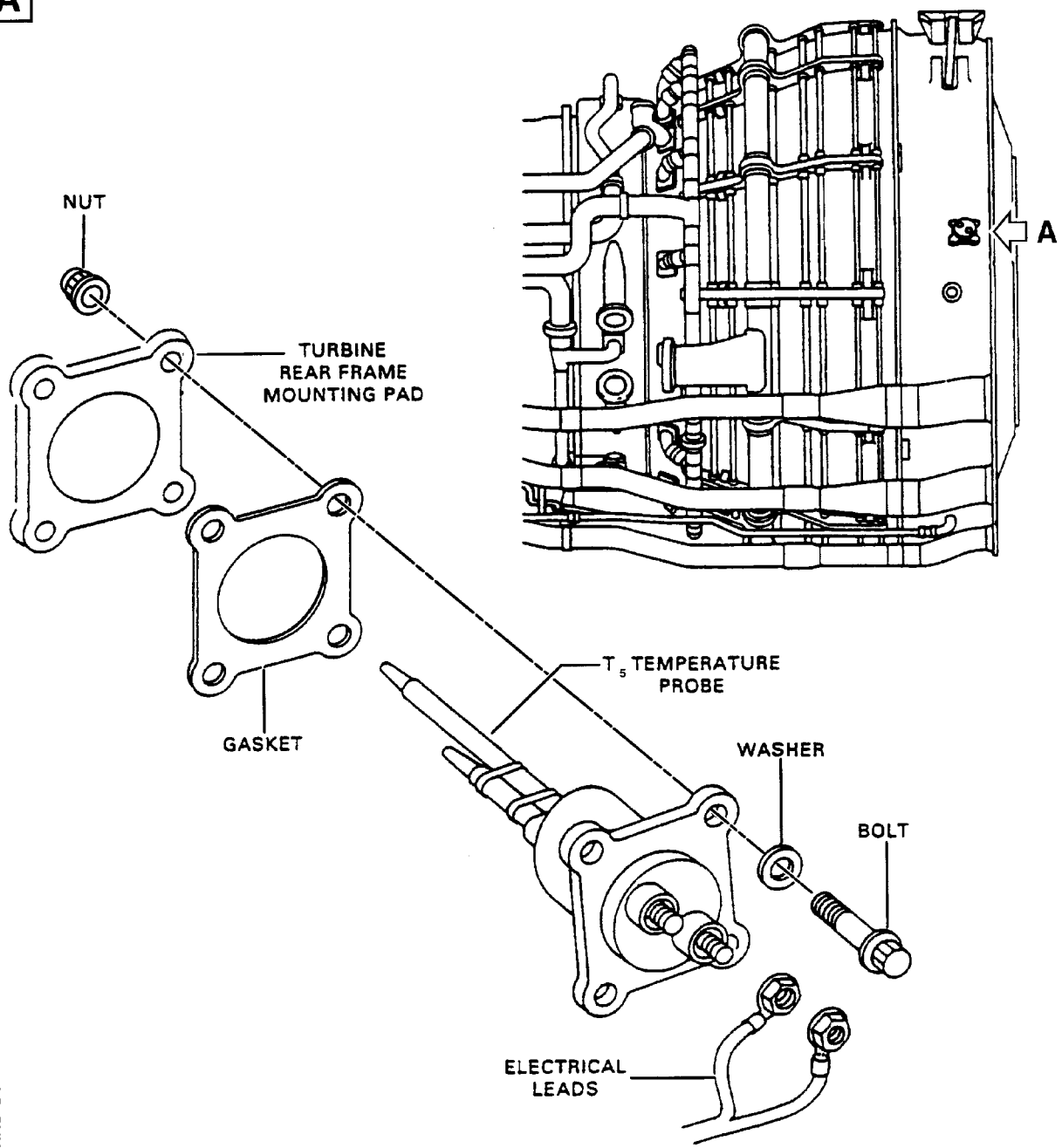

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T5 Core Exhaust Temperature Probe
Figure 401

0.16 m.daN).

(d)TORQUE the large nut to between 20 and 30 lbf.in. (0.23 and 0.34 m.daN).

D. Close-Up

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2)Remove access platform.

(3)Close core, thrust reverser and fan cowl doors and close circuit breakers (Ref. 71-13-00, P. Block 301). Close circuit breaker 12TU.

T5 CORE EXHAUST TEMPERATURE SENSOR - INSPECTION/CHECK

1. General

This procedure pertains to the inspection/check of the T5 temperature sensor.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Millivoltmeter
C.	Heat Gun
Referenced Procedures	
- 71-13-00, P. Block 301	Cowl Doors
- 77-31-03, P. Block 401	T5 Core Exhaust Temperature Sensor

3. Procedure

A. Job Set-Up

(1)Open, safety and tag circuit breakers for the appropriate engine and open cowl doors (Ref. 71-13-00, P. Block 301).

(2)Remove sensor (Ref. 77-31-03, P. Block 401).

B. Inspection

INSPECT/CHECK	MAXIMUM SERVICEABLE LIMITS	REMARKS
(1)Check Probe Continuity : Connect (pos.) lead of voltmeter to chromel terminal stud and (neg.) lead to alumel stud	Using heat gun, heat probe junctions. A positive deflection should be seen on voltmeter	If no deflection is observed, replace sensor (Ref. 77-31-03, P. Block 401)
(2)Mounting Flanges for : (a)Cracks around mounting holes	None allowed	Replace sensor (Ref. 77-31-03, P. Block 401)
(3)Stripped or damaged threads on alumel or chromel terminals	50% of one entrance thread or 10% each of two entrance threads, provided high or displaced metal is removed	Replace defective sensor (Ref. 77-31-03, P. Block 401)
(4)Cracking, bending, denting, erosion, burning, or bursting of probe	Minor damage if its structural integrity is not impaired	Replace defective sensor (Ref. 77-31-03, P. Block 401)

C. Close-Up
(1)Install sensor (Ref. 77-31-03, P. Block 401).
(2)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(3)Close cowl doors (Ref. 71-13-00, P. Block 301). Remove safety clips and tags and close circuit breakers.

PS14 PRESSURE PROBE - REMOVAL/INSTALLATION

1. General

There are two configurations of the PS 14 pressure probe. Configuration 1 (pre SB-GE- 72-232) is located at the 8.30 o'clock position. Configuration 2 as introduced by SB-GE- 72-232 is located at the 1.30 o'clock position. The removal/installation for both configurations is the same.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Protective Caps
C.	Access Platform
D.	Torque Wrench 55-300 lbf. in. (0.62 - 3.39 m. daN)
E. Material No.C02-019	Anti-Seize Compounds, Lubricants, Oils (Ref. 70-00-00)
Referenced Procedure - 71-13-00, P. Block 301	Cowl Doors

3. Procedure

A. Job Set-Up

(1)Remove safety clips and tags and close the appropriate circuit breakers, open left fan cowl door (Ref. 71-13-00, P. Block 301).

(2)Install access platform.

B. Removal (Ref. Fig. 401, 402)

(1)Disconnect tube from sensor nipple.

(2)Remove lockwire from the 4 mounting bolts. Remove bolts and washers.

(3)Carefully remove sensor from its port in the aft fan case.

(4)Remove nipple and preformed packing from sensor. Discard packing.

C. Installation (Ref. Fig. 401, 402)

NOTE : Direction of installation is not critical. Probe will operate in either direction. There is no gasket required for installation.

(1)Lubricate a preformed packing with oil (C02-019) and install packing onto nipple.

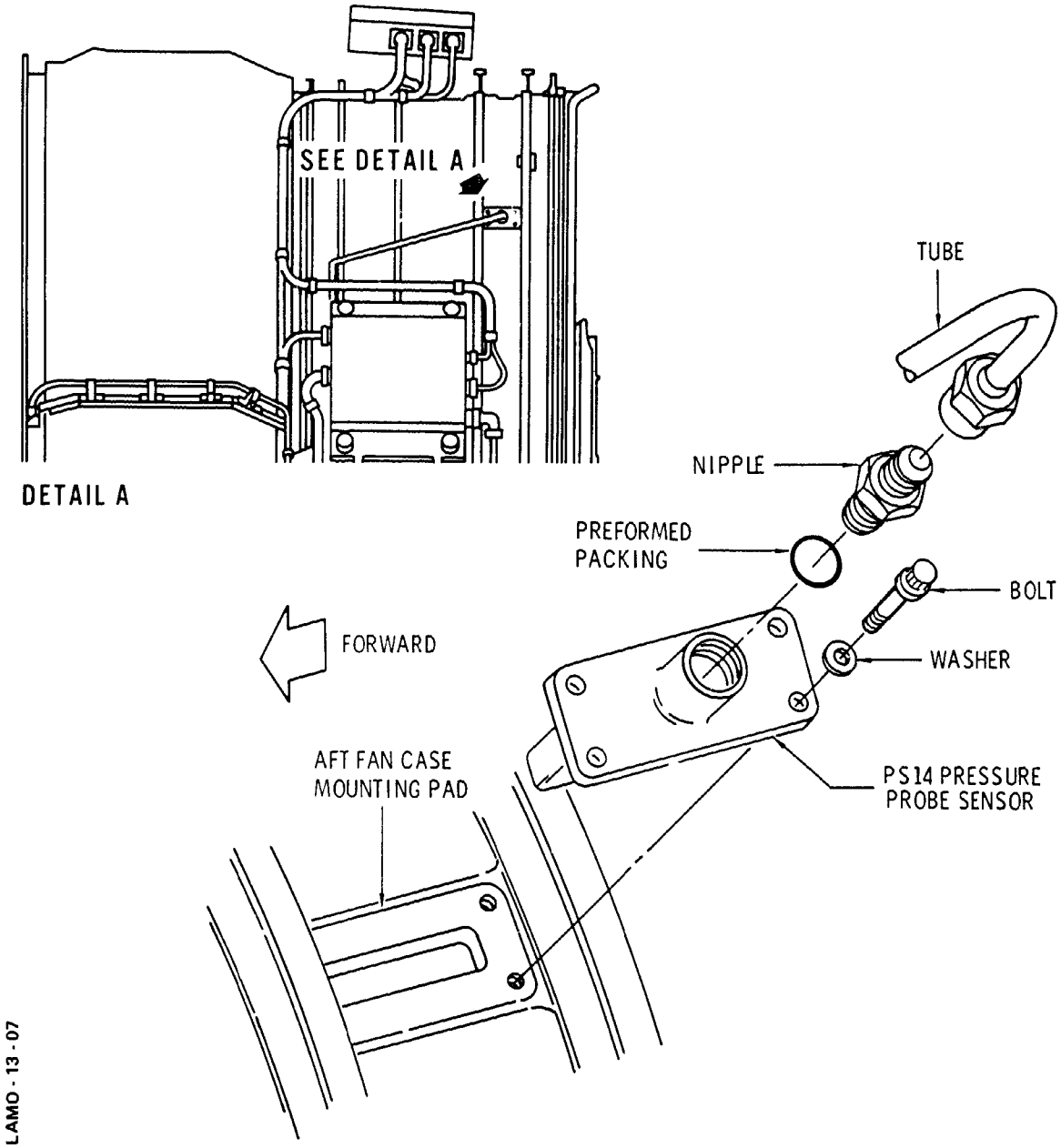
(2)Install nippple into sensor. TORQUE to between 180 and 200 lbf. in. (2.03 and 2.26 m. daN).

(3)Carefully insert sensor into its port in aft fan case.

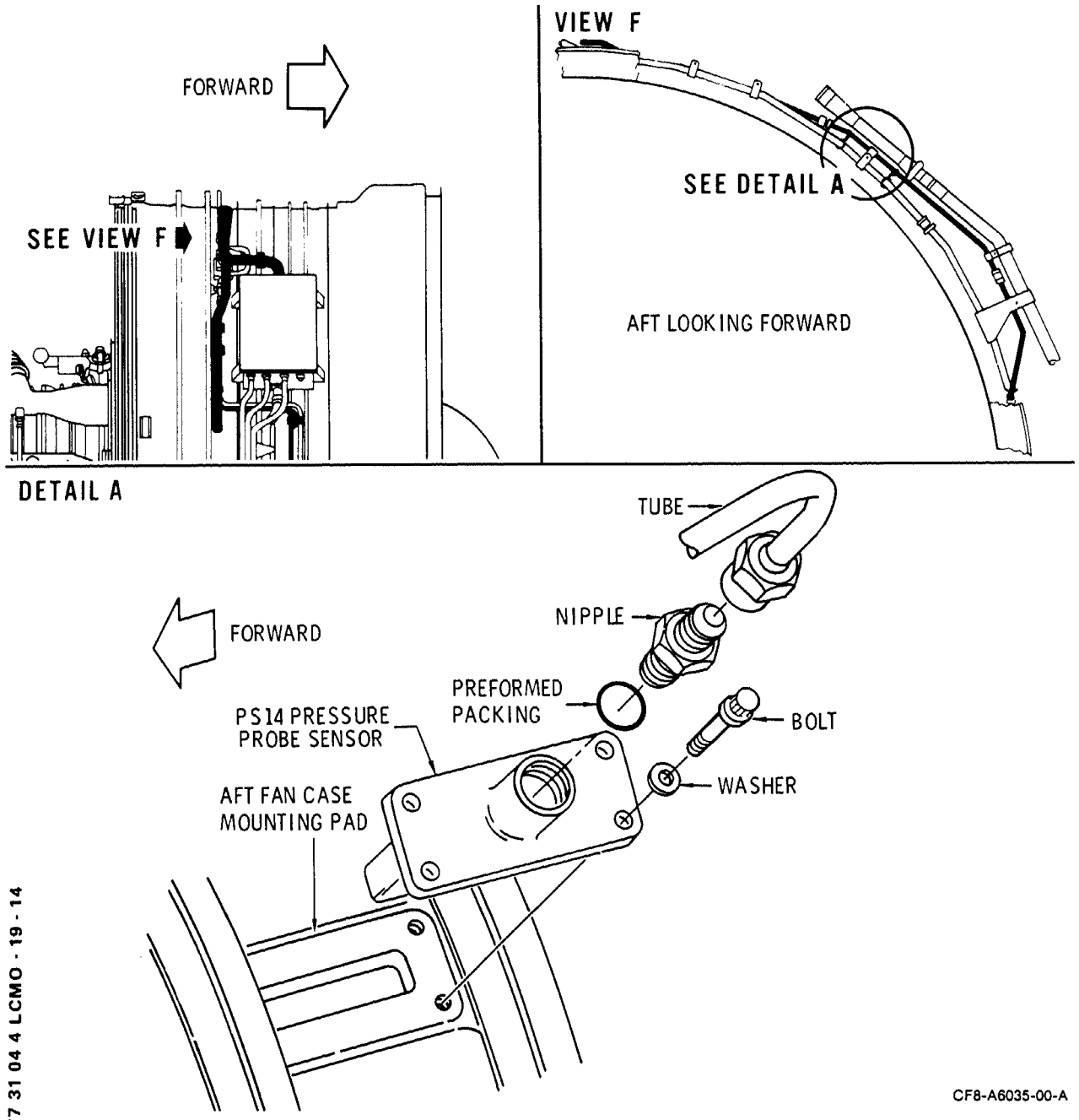
(4)Install 4 bolts into sensor pad. TORQUE to between 55 and 70 lbf. in. (0.62 and 0.79 m. daN) and wirelock.

(5)Connect tube from PMUX to nipple. TORQUE coupling to between 270 and 300 lbf. in. (3.05 and 3.39 m.daN).

D. Close-Up



PS14 Pressure Probe (Configuration 1)
Figure 401



PS14 Pressure Probe (Configuration 2)
Figure 402

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Remove access platform.
(3)Close left fan cowl door (Ref. 71-13-00, P. Block 301).
Remove safety clips and tags and close circuit breakers,

PS14 PRESSURE PROBE - INSPECTION/CHECK

1. General
This procedure pertains to the inspection/check of the PS14 pressure probe.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Access Platform
Referenced Procedures	
- 71-13-00, P. Block 301	Cowl Doors
- 77-31-04, P. Block 401	PS14 Pressure Probe

3. Procedure

A. Job Set-Up
(1)Open, safety and tag circuit breakers for the appropriate engine and open left fan cowl door (Ref. 71-13-00, P. Block 301).
(2)Remove PS14 pressure probe (Ref. 77-31-04, P. Block 401).

B. Visual Inspection/Check

INSPECT/CHECK	MAXIMUM SERVICEABLE LIMITS	REMARKS
(1)Mounting Flange for :		
(a)Cracks	None allowed	Replace probe per (Ref. 77-31-04, P. Block 401)
(b)Dents	Any amount, provided probe still seats properly	Replace probe per (Ref. 77-31-04, P. Block 401)
(2)Housing for :		
(a)Cracks	None allowed	Replace probe per (Ref. 77-31-04, P. Block 401)
(b)Dents	None allowed	Replace probe per (Ref. 77-31-04, P. Block 401)
(3)Orifices for :		
(a)Clogged passages	None allowed	Clean
(b)Deformation	None allowed	Replace probe per (Ref. 77-31-04, P. Block 401)

C. Close-Up
(1)Install PS14 pressure probe (Ref. 77-31-04, P. Block 401).

(2)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(3)Close fan cowl doors (Ref. 71-13-00, P. Block 301). Remove safety clips and tags and close circuit breakers.

PROPULSION MULTIPLEXER (PMUX) - REMOVAL/INSTALLATION

1. General

The PMUX is located on the fan case at approximately the 10 o'clock position (aft looking forward). Access is gained by opening the left fan cowl door.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Torque Wrench 180 - 300 lbf.in. (2.03 - 3.39 m.daN)
Referenced Procedure - 71-13-00, P. Block 301	Cowl Doors

3. Procedure

A. Job Set-Up

(1)Open the circuit breaker that follows :

PANEL	SERVICE	IDENT.	LOCATION
21VU	AIDS PMUX	12TU	105/E05

(2)Open, safety and tag the appropriate circuit breakers and open fan and thrust reverser cowl doors (Ref. 71-13-00, P. Block 301).

B. Removal (Ref. Fig. 401)

(1)Disconnect the electrical connectors that follow :

(a)Power (CMJ 1).
(b)ESNP (CJP 2).
(c)ARNIC out (CMJ 6).
(d)Fan I/O (CMJ 4).
(e)Core I/O (CMJ 5).

CAUTION : WHEN REPLACING THE PMUX, CONNECTOR CJP 2 (ENGINE SERIAL NO. PLUG) MUST STAY WITH ENGINE DUE TO SPECIFIC P/N ARRANGEMENT OF ELECTRICAL CONNECTOR.

(2)Remove the bolt and the flatwasher to disconnect grounding leads from PMUX.

(3)Disconnect the tubes that follow : discard preformed packing.

(a)P25.
(b)P49.
(c)PS3.
(d)P14.

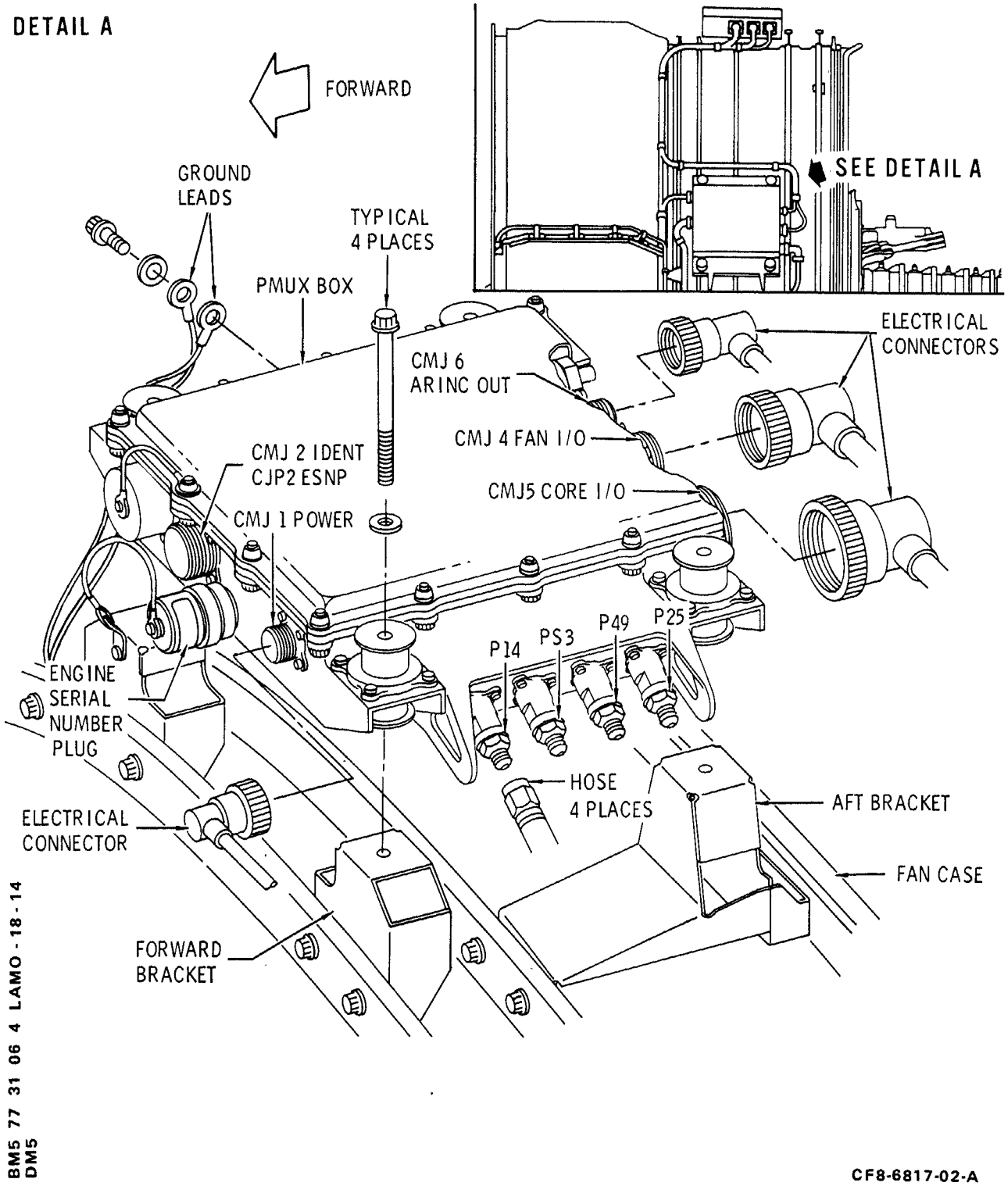
(4)Remove four bolts, nuts and flatwashers to remove the PMUX from the fan case.

NOTE : When the PMUX is replaced, remove the tube connections for installation in the new PMUX.

C. Installation
(1)If not installed, install new preformed packings on the four tube connections. Install the four connections in the PMUX. TORQUE the connections P14, P49 and P25 to between 180 and 200 lbf.in. (2.03 and 2.26 m.daN). TORQUE the connection PS3 to between 155 and 175 lbf.in. (1.75 and 1.98 m.daN).
(2)Mount PMUX to fan case with four bolts, nuts and flatwashers. TORQUE nuts to between 100 and 130 lbf.in. (1.13 and 1.47 m.daN).
(3)Install new preformed packings and connect the tubes that follow :
(a)P25 - TORQUE to between 270 and 300 lbf.in. (3.05 and 3.39 m.daN).
(b)P49 - TORQUE to between 270 and 300 lbf.in. (3.05 and 3.39 m.daN).
(c)PS3 - TORQUE to between 180 and 200 lbf.in. (2.03 and 2.26 m.daN).
(d)P14 - TORQUE to between 270 and 300 lbf.in. (3.05 and 3.39 m.daN).
(4)Connect the electrical connectors that follow and hand tighten :
(a)Power (CMJ 1).
(b)ESNP (CJP 2).
(c)ARNIC out (CMJ 6).
(d)Fan I/O (CMJ 4).
(e)Core I/O (CMJ 5).
(5)Connect grounding leads to PMUX with a bolt and flatwasher. TORQUE bolt to between 40 and 60 lbf.in. (0.45 and 0.68 m.daN).

D. Test : Not required
Note : The correct operation of the PMUX can be checked by making certain that the engine data was recorded by the Digital Flight Data Acquisition Unit after an engine operation.

E. Close-Up
(1)Make certain that the working area is clean and clear of tools and other items of equipment.
(2)Remove safety clips and tags and close circuit breakers. Close fan cowl doors (Ref. 71-13-00, P. Block 301).



PMUX - Removal/Installation
Figure 401

P25/T25 PRESSURE/TEMPERATURE SENSOR - REMOVAL/INSTALLATION

1. General

The P25/T25 pressure/temperature sensor is located at the 6:30 o'clock position on the fan frame, aft of the variable bleed valves (VBV'S).

2. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Corrosion Resistant Steel Lockwire
C.	Preformed Packing
D.	Gasket
E. Material No.C02-019	Anti-Seize Compounds, Lubricants, Oils (Ref. 70-00-00)
F.	Torque Wrench 55 - 300 lbf. in. (0.62 - 3.39 m.daN.)
Referenced Procedure - 71-13-00, P. Block 301	Cowl Doors

3. Procedure

A. Job Set-Up

(1)Open the following circuit breaker :

PANEL	SERVICE	IDENT.	LOCATION
21VU	AIDS PMUX	12TU	105/E05

(2)Open, safety and tag the appropriate circuit breakers and open fan and thrust reverser cowl doors (Ref. 71-13-00, P. Block 301).

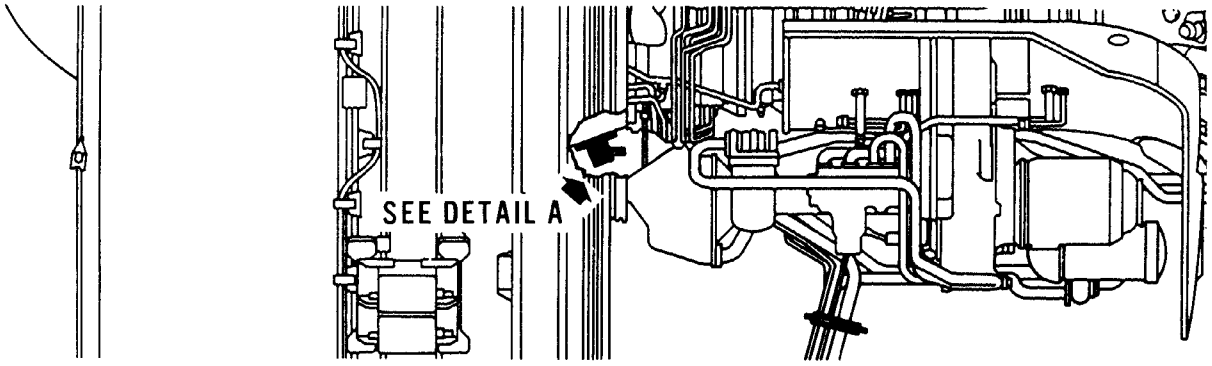
B. Removal(Ref. Fig. 401)

(1)Disconnect air tube from probe.
(2)Remove and retain union for reuse. Discard preformed packing.
(3)Disconnect electrical connector.
(4)Cut and remove lockwire, four bolts and washers securing probe to fan frame.
(5)Carefully remove probe, discard gasket.

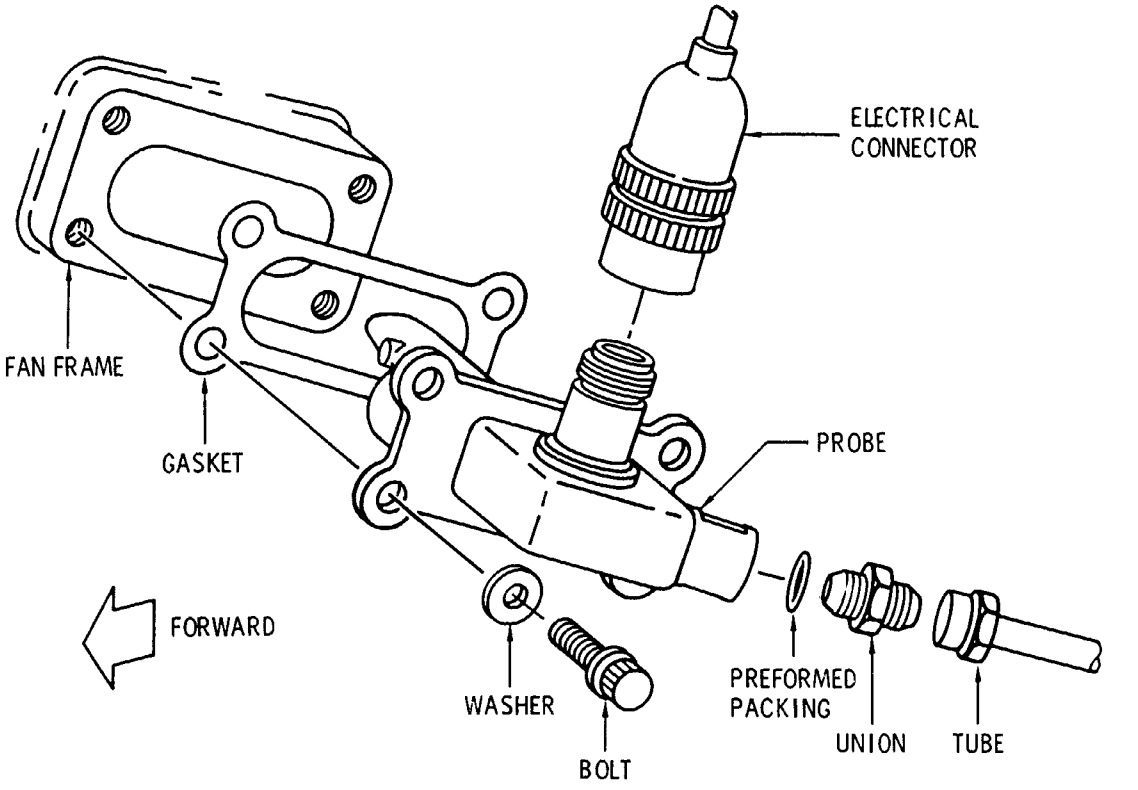
C. Installation (Ref. Fig. 401)

WARNING : USE CARE WHEN INSTALLING PROBE IN PORT MAKE CERTAIN THAT PROBE SENSING PORTS ARE FACING FORWARD.
PROBE WILL NOT OPERATE IF INSTALLED BACKWARDS.

(1)Place gasket on fan frame boss and carefully insert probe in port.
(2)Secure probe to fan frame with four bolts and washers. TORQUE bolts to between 55 and 70 lbf. in.(0.62 and 0.79 m.daN.).
(3)Lightly coat preformed packing with engine oil and install on to union.
(4)Install union into probe and TORQUE to between 180 and 200 lbf. in.(2.03 and 2.26 m.daN). Wirelock union to probe.



DETAIL A



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P25/T25 Pressure Temperature Sensor
Figure 401

(5)Install air line on to union and TORQUE B-nut to between 270 and 300 lbf. in.(3.05 and 3.39 m.daN.).
(6)Connect electrical connector and hand tighten.

D. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Remove safety clips and tags and close circuit breakers, close thrust and fan reverser cowl doors (Ref. 71-13-00, P. Block 301).

P25-T25 PRESSURE TEMPERATURE SENSOR - INSPECTION/CHECK

1. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Megger
Referenced Procedures	
- 71-13-00, P. Block 301	Cowl Doors
- 77-31-07, P. Block 401	P25/T25 Pressure Temperature Sensor

2. Procedure

A. Job Set-Up

(1) Open, safety and tag the appropriate circuit breakers, and open fan and thrust reverser cowl doors (Ref. 71-13-00, P. Block 301).

(2) Remove sensor (Ref. 77-31-07, P. Block 401).

B. Inspection/Check

INSPECT/CHECK	MAXIMUM SERVICEABLE LIMITS	REMARKS
(1) Air inlet and exit ports for foreign particles blocking air passages	None allowed	Blow compressed air into the air exit slots. Flush using syringe and household detergent
(2) (a) Temperature probe for continuity	2.4 ohms	Replace probe
(b) Insulation resistance	10 megohms	Replace probe
(3) Probe housing for nicks, scratches or dents	Any number not exceeding 10 percent of housing thickness after removal of high metal	Replace probe

D. Close-Up

(1) Install sensor (Ref. 77-31-07, P. Block 401).

(2) Remove safety clips and tags and close circuit breakers, close thrust reverser and fan cowl doors (Ref. 71-13-00, P. Block 301).

VARIABLE STATOR VANE POSITION TRANSDUCER - REMOVAL/INSTALLATION

1. General

This procedure pertains to the removal and installation of the VSV position transducer which is installed on the right side of the engine.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform
B.	Circuit Breaker Safety Clips
Referenced Procedures	
- 71-13-00, P. Block 301	Cowl Doors
- 77-31-08, P. Block 501	VSV Position Transducer

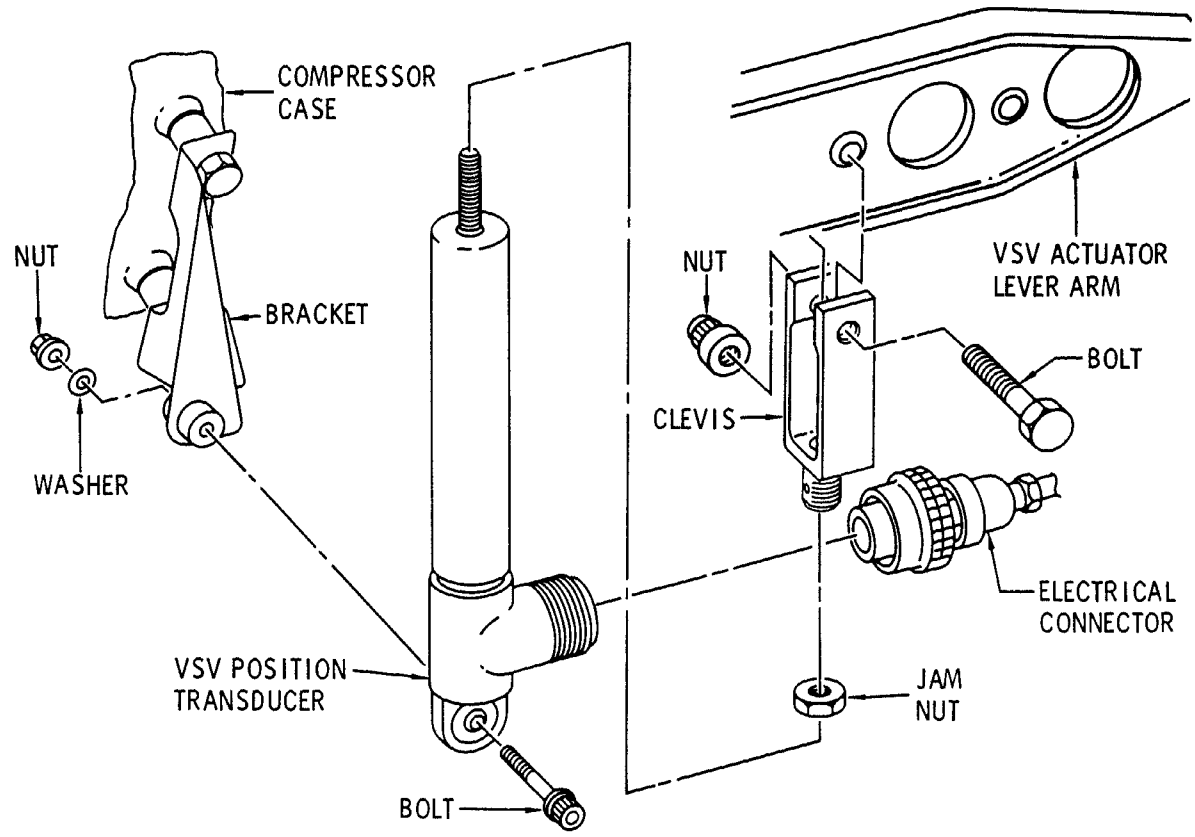
3. Procedure

A. Job Set-Up
  (1)Open, safety and tag the circuit breakers for the appropriate engine and open fan cowl and thrust reverser door (Ref. 71-13-00, P. Block 301).
  (2)Position access platform.

B. Removal (Ref. Fig. 401)
  (1)Remove electrical connector from transducer.
  (2)Remove nut and bolt securing clevis to the VSV actuator lever arm.
  (3)Remove bolt, nut, and washer securing transducer to bracket.
  (4)Remove transducer assembly.
  (5)Remove safetywire, loosen the small jamnut, and rotate the transducer until detached from the clevis assembly.
  (6)Remove the small jamnut from the threaded end of the transducer and retain for reuse.

C. Installation (Ref. Fig. 401)
  (1)Install jamnut to threaded rod of transducer and thread all the way down.
  (2)Thread transducer into the clevis assembly.
  (3)Lightly tighten but do not TORQUE small jamnut until after transducer is adjusted.
  (4)Install head end of transducer to bracket using bolt, washer, and nut. TORQUE nut to between 24 and 27 lbf. in. (0.27 - 0.31 m.daN).
  (5)Attach clevis to the second spherical bearing from front of the VSV actuator lever using bolt and nut. TORQUE nut to between 55 and 70 lbf. in. (0.62 - 0.79 m.daN).
  (6)Connect electrical connector to transducer. Tighten connector handtight and using soft-jawed pliers, further tighten to a maximum of 20 degrees.
  (7)Adjust VSV transducer (Ref. 77-31-08, P. Block 501).

D. Close-Up
  (1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
  (2)Remove access platform.



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VSV Position Transducer Removal/Installation
Figure 401

(3)Close fan cowl and thrust reverser doors and remove safety clips and tags and close the appropriate circuit breakers (Ref. 71-13-00, P. Block 301).

VARIABLE STATOR VANE POSITION TRANSDUCER - ADJUSTMENT/TEST

1. General

This procedure pertains to the adjustment and test of the VSV linear amplifying displacement transducer, mounted on the right hand side of the high pressure compressor stator case.

2. Equipment and Materials

ITEM	DESIGNATION
A. 2C6395	Actuator, VSV and Variable Bypass Valve
B. 2C14232	Indicator Set - VSV Position
C. Material No.C02-021	Anti-Seize Compounds, Lubricants, Oils (Ref. 70-00-00)
D. Material No.C04-002	Cleaning Compounds and Solvents (Ref. 70-00-00)
E.	Torque Wrench
Referenced Procedures	
- 71-00-00, P. Block 501	Power Plant - General
- 71-13-00, P. Block 301	Cowl Doors
- 77-31-08, P. Block 401	Variable Stator Vane Position Transducer

3. Procedure

A. Job Set-Up

(1) Open safety and tag the appropriate circuit breakers and open fan and thrust reverser cowl doors (Ref. 71-13-00, P. Block 301).

B. Adjustment/Test

(1) Disconnect at the saddle fitting the VSV head-end and rod-end lines from the main engine control (MEC) pressure lines.

(2) Connect hydraulic actuator, 2C6395, to VSV actuator head-end and rod-end tubes previously disconnected.

CAUTION : DO NOT EXCEED 300 PSIG (20.68 BARS) SUPPLY PRESSURE.

(3) Using the hydraulic actuator, 2C6395, apply VSV head-end pressure and pump the VSV'S to the fully open position with the VSV actuators against the mechanical stops. Maintain 200-300 psig (13.78-20.68 bars) head-end pressure.

(4) Read VSV open position.

NOTE : On some aircraft equipped with AIDS, VSV position can be read on the MTP. On aircraft not equipped with AIDS, tooling 2C14232 must be connected to read the transducer.

(a) Aircraft without AIDS.

1 Connect indicator 2C14232 to base of transducer.

2 With VSV fully open, set indicator 2C14232 to -1.50 ± 0.05 degrees (0.49 ± 0.005VDC) by rotating the transducer stud end relative to the adjustment jamnut on the clevis.

3 TORQUE the jamnut, securing the clevis pushrod, to between 55 and 70 lbf. in. (0.62 and 0.79 m.daN). Wirelock the jamnut to the clevis.

(b) Aircraft with AIDS (through PMUX) or aircraft equipped with AIDS

internal wiring.

1 With VSV fully open, set aircraft indicator to -1.5 ± 0.05 degrees (0.49 ± 0.005VDC) by rotating the transducer stud end relative to the adjustment jamnut on the clevis.

2 TORQUE the jamnut, securing the clevis pushrod, to between 55 and 70 lbf. in. (0.62 and 0.79 m.daN). Wirelock the jamnut to the clevis.

(5)Using hydraulic medium (C02-021 or C04-002) and hydraulic actuator, 2C6395, apply pressure to the VSV rod-end line, to completely close the the VSV's. After the VSV's are fully closed (VSV actuators on mechanical stops), maintain 200-300 psig (13.78 - 20.68 bars) rod-end pressure.

(6)Read VSV closed position.

(a)Aircraft without AIDS.

1 With VSV's fully closed, check transducer for full travel capability with no binding. VSV indicator 2C14232, should read 42.20 degrees ± 1.0 degree (4.773 ± 0.1VDC).

2 If reading is not within limits, troubleshoot system.

(b)Aircraft with AIDS (through PMUX) or aircraft equipped with AIDS internal wiring.

1 With VSV's fully closed, check transducer for full travel capability with no binding. Aircraft indicator should read 42.20 degrees ± 1.0 degree (4.773 ± 0.1VDC).

2 If reading is not within limits, a correction factor must be calculated.

NOTE : Due to an impedance mismatch between the aircraft equipped with AIDS internal wiring and the VSV displacement transducer, a reading error may be introduced in the measurement of VSV positions.

3 Compute VSV tracking correction factor using the formula and example that follows :

VSV Tracking Correction Factor Formula

$$\frac{42.2 \text{ deg.}}{\text{Actual Closed Reading}} = \text{Correction Factor}$$

Example :

$$\frac{42.2 \text{ deg.}}{43.8 \text{ deg.}} = 0.964 \text{ (Correction Factor)}$$

The correction factor is used in the Variable Stator Vane (VSV) tracking check (Ref. 71-00-00, P. Block 501, Para. 11).

(7)Relieve pressure from hydraulic actuator, 2C6395, and disconnect the actuator from the head-end and rod-end supply lines.

(8)Connect saddle fittings at the VSV head-end and rod-end lines from the main engine control (MEC) pressure lines. TORQUE the B-nut on the VSV rod-end tube to between 270 and 300 lbf. in. (3.05 and 3.39 m.daN) and the VSV head-end tube to between 450 and 550 lbf. in. (5.08 and 6.21 m.daN).

C. Close-Up

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2)Close thrust reverser and fan cowl doors. Remove safety clips and tags and close circuit breakers (Ref. 71-13-00, P. Block 301).

VARIABLE BYPASS VALVE POSITION TRANSDUCER - REMOVAL/INSTALLATION

1. General

Removal/Installation for VBV position transducers of both left and right engines are identical.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform
B.	Circuit Breaker Safety Clips
C. Material No.C01-006	Adhesives, Plastics, Sealants (Ref. 70-00-00)
D. Material No.C04-001	Cleaning Compounds and Solvents (Ref. 70-00-00)
Referenced Procedures	
- 71-13-00, P. Block 301	Cowl Doors
- 77-31-09, P. Block 501	VBV Position Transducer

3. Procedure

A. Job Set-Up

(1) Open, safety and tag the circuit breakers for the appropriate engine and open fan cowl and thrust reverser doors (Ref. 71-13-00, P. Block 301).

(2) Position access platform.

B. Removal (Ref. Fig. 401)

(1) Remove the liner segments on each side of number 10 fan frame strut by removing the four screws securing each liner segment.

(2) Disconnect electrical connector from transducer.

(3) Disconnect transducer rod-end from the unison ring mount pad by removing the nut and washer and sliding rod-end off of mount pad stud.

(4) Remove bolt and nut securing transducer mount lug to bracket mounted on stage 5 stator case forward flange and remove transducer from engine.

(5) Loosen jamnut securing transducer rod-end and remove rod-end and jamnut from transducer. Retain for reuse.

C. Installation (Ref. Fig. 401)

(1) Install jamnut to threaded end of transducer and run it all the way down.

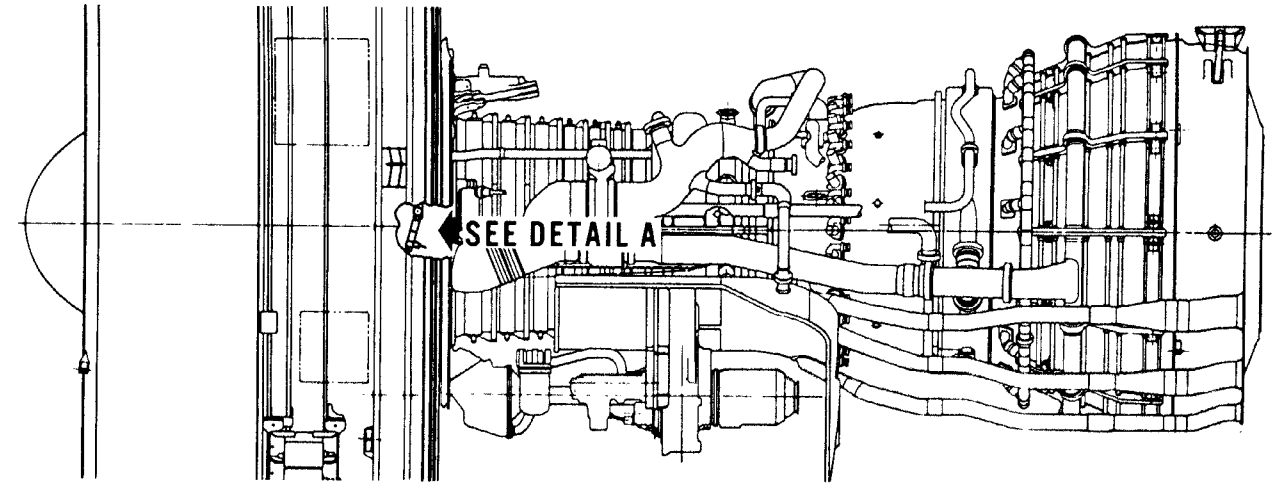
(2) Install rod-end to threaded end of transducer and run it down until threads are completely filling the witness hole. Loosely tighten but do not torque jamnut at this time.

(3) Install transducer onto engine and secure transducer mount lug to bracket mounted on stage 5 stator case using bolt and nut. TORQUE nut to between 24 and 27 lbf.in. (0.27 and 0.31 m.daN).

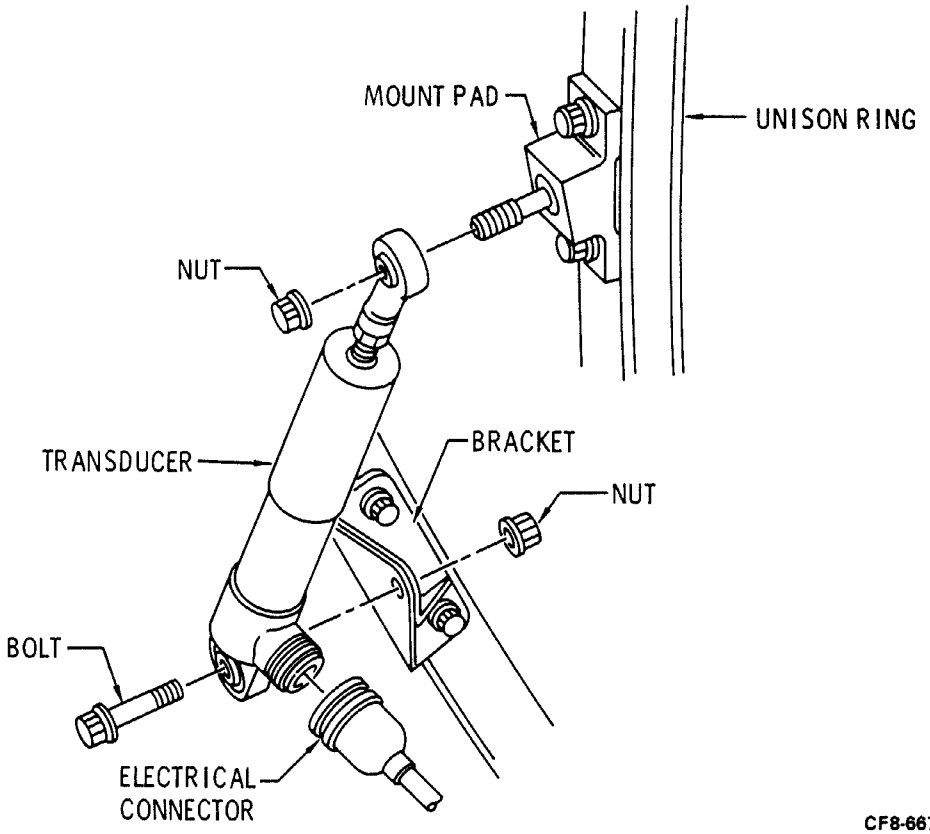
(4) Slide rod-end onto unison ring mount pad stud and secure using nut and washer. TORQUE nut to between 55 and 70 lbf. in (0.62 and 0.79 m.daN).

(5) Connect electrical connector to transducer. Tighten hand-tight and using soft-jawed pliers, tighten additionally, a maximum of 20 degrees.

(6) Adjust (calibrate) transducer (Ref. 77-31-09, P. Block 501).



DETAIL A



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VBV Position Transducer-Removal/Installation
Figure 401

(7)Install liner segments on each side of fan frame strut number 10 and secure with screws. Torque screws to between 55 and 70 lbf. in. (0.62 and 0.79 m.daN).
NOTE : Prior to installing liner segments, remove any old RTV residue and clean the edge of the segments using solvent (C04-001).
(8)Caulk circumferential gaps between the liner segments using RTV-103 (C01-006). Contour RTV to adjacent surfaces and ensure all contour changes are smooth. Cure per manufacturer's instructions.

D. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Remove access platform.
(3)Close fan cowl and thrust reverser doors and remove safety clips and tags and close the appropriate circuit breakers (Ref. 71-13-00, P. Block 301).

VARIABLE BYPASS VALVE POSITION TRANSDUCER - ADJUSTMENT/TEST

1. General

After installing the variable bypass valve linear variable displacement transducer, it will be necessary to adjust the length of the transducers' movable rod in order to provide an accurate signal for the readout of the Airborne Integrated Data System (AIDS).

2. Equipment and Materials

ITEM	DESIGNATION
A. 2C6395	Actuator, IGV Hydraulic
B.	Container 5 Gal. (19 liters)
C.	Caps and Plugs
D.	Pull Scale 0 - 20 lbf (0 - 8.9 daN)
E. Material No.C02-021	Anti-Seize Compounds, Lubricants, Oils (Ref. 70-00-00)
F. Material No.C04-002	Cleaning Compounds and Solvents (Ref. 70-00-00)
G.	Torque Wrench 55 - 550 lbf.in. (0.62 - 6.21 m.daN)

3. Procedure

A. Adjustment (Calibration)

(1) Disconnect the VBV rod and head-end lines at the MEC.

(2) Connect the VBV rod and head-end lines of the hydraulic actuator, 2C6395G05, to the respective fittings on the VSV/VBV fuel manifold that were disconnected in the above step.

(3) Using hydraulic medium (C02-021 or C04-002) and hydraulic actuator, 2C6395G05, apply pressure to the VBV rod-end line to completely close the VBV's. After the VBV's are fully closed (VBV actuators on mechanical stops), maintain 200-300 psig (13.78-20.68 bars) rod-end pressure.

NOTE : Continuous pumping of hydraulic actuator, 2C6395G05, may be required to maintain 200-300 psig (13.78-20.68 bars) system pressure due to VBV actuator cross-piston leakage.

(4) With the VBV actuators on their closed mechanical stops, adjust the transducer as follows :

(a) Loosen the jamnut securing the movable rod to the clevis if previously tightened during VBV transducer installation.

(b) Turn the transducer stud end to obtain a reading of 0 inches of feedback stroke as displayed on the Airborne Integrated Data System (AIDS) in the flight compartment.

(c) After proper readout is obtained, TORQUE the jamnut securing the clevis to between 55 and 70 lbf.in. (0.62 and 0.79 m.daN). Tighten jamnut to clevis.

(5) Relieve pressure from hydraulic actuator, 2C6395G05, and disconnect the head and rod-end supply lines from the VSV/VBV fuel manifold on the lower forward right side of the accessory compartment.

(6) Connect the VBV head and rod-end lines from the main engine control (MEC)

to the VSV/VBV fuel manifold fittings. TORQUE B-nut on the VBV head-end tube to between 270 and 300 lbf.in. (3.05 and 3.39 m.daN) and the VBV rod-end tube to between 450 and 550 lbf.in. (5.08 - 6.21 m.daN).

ENGINE VIBRATION INDICATING - DESCRIPTION AND OPERATION

1. General

The engine vibration monitoring is recommended as a diagnostic indication, to give a tendency and provide for maintenance actions on the engine.
The engine vibration measurement channel comprises :
- two transducers (piezo-electric accelerometers)
- a signal conditioner
- two vibration indications, N1 and N2, on R ECAM display unit.

2. Vibration Transducers (Ref. Fig. 001, 002)

The transducers are piezo-electric accelerometers. There are two transducers per engine, which are located :
- one in the fan area ; this accelerometer senses the LP rotor vibration
- the other in the HP compressor area (on the compressor case) ; this accelerometer senses HP rotor vibration.

The engine vibration information is transformed into electrical loads (coulombs) on the faces of a crystal by the pressure of a fly weight supported by the crystal.
The transducer output signal is transmitted to a signal conditioner.

3. Signal Conditioner

(Ref. Fig. 003)
(Ref. Fig. 004)

The signal conditioner is located in the avionics compartment, rack 90VU, shelf 95VU.

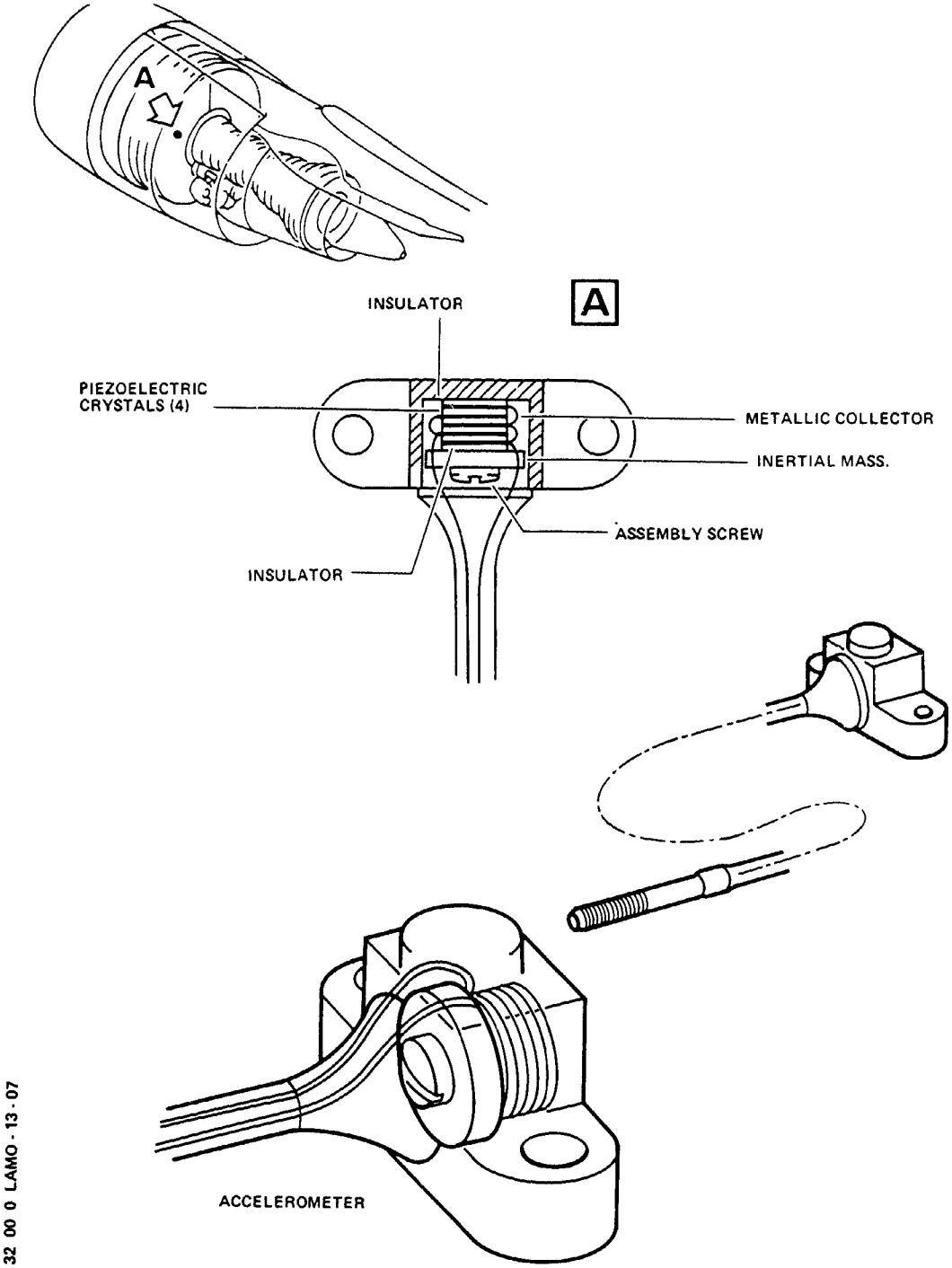
A. Input Signals

(1) From the vibration accelerometers

The signal conditioner receives signals from :
- the accelerometer in the fan area
- the accelerometer in the HP compressor area, and through two independent measurement channels.

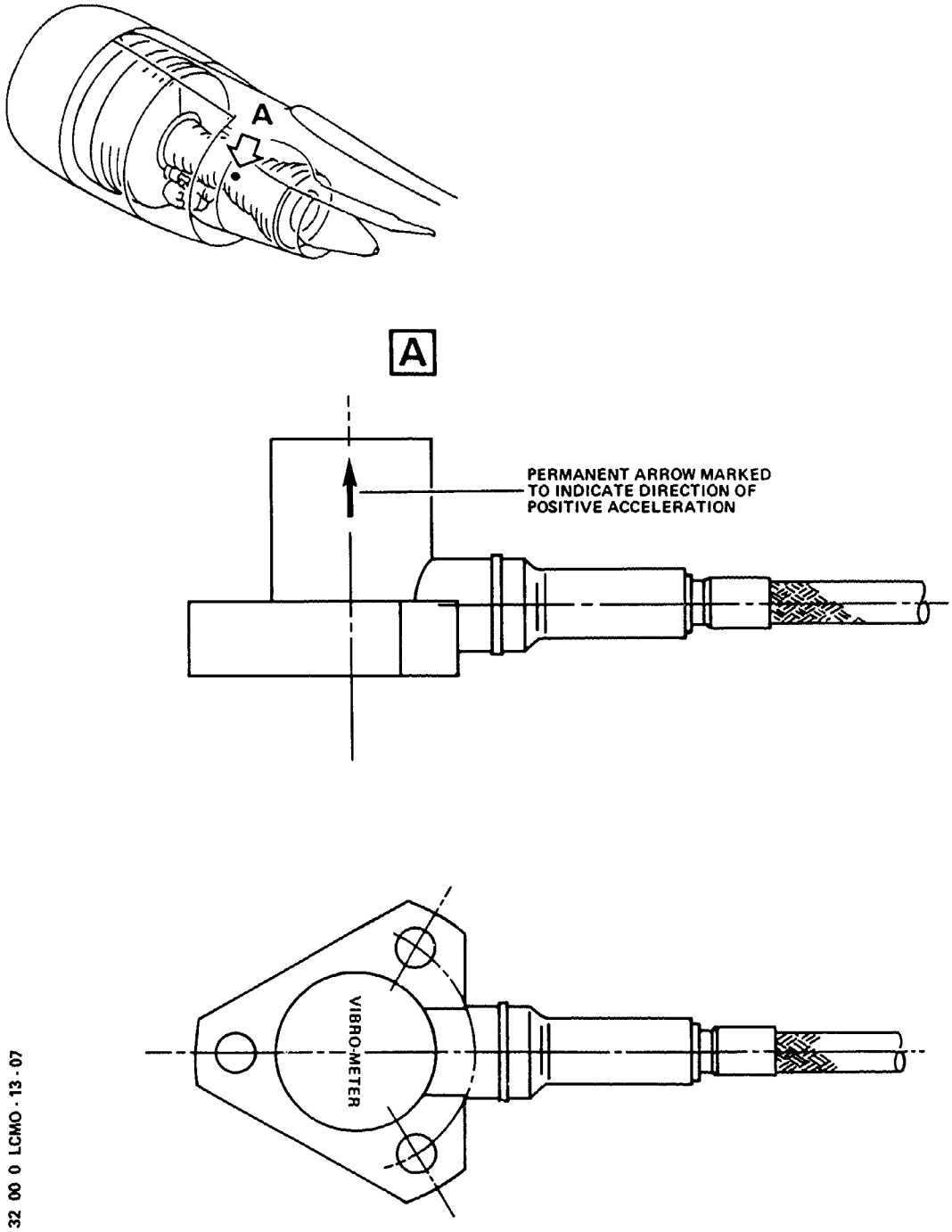
(2) From the tachometer sensors

The signal conditioner receives signals from :
- N1 speed sensor (rotational speed of the LP rotor)
- N2 speed sensor (rotational speed of the HP rotor)



BM5 77 32 00 0 LAMO-13-07
DM5

Vibration Transducer N1
Figure 001



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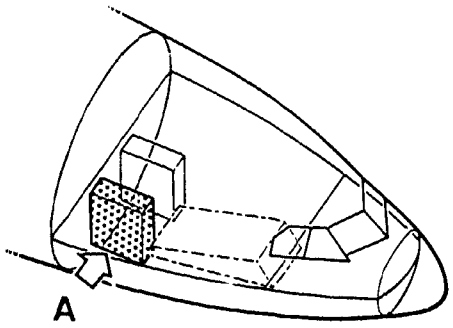
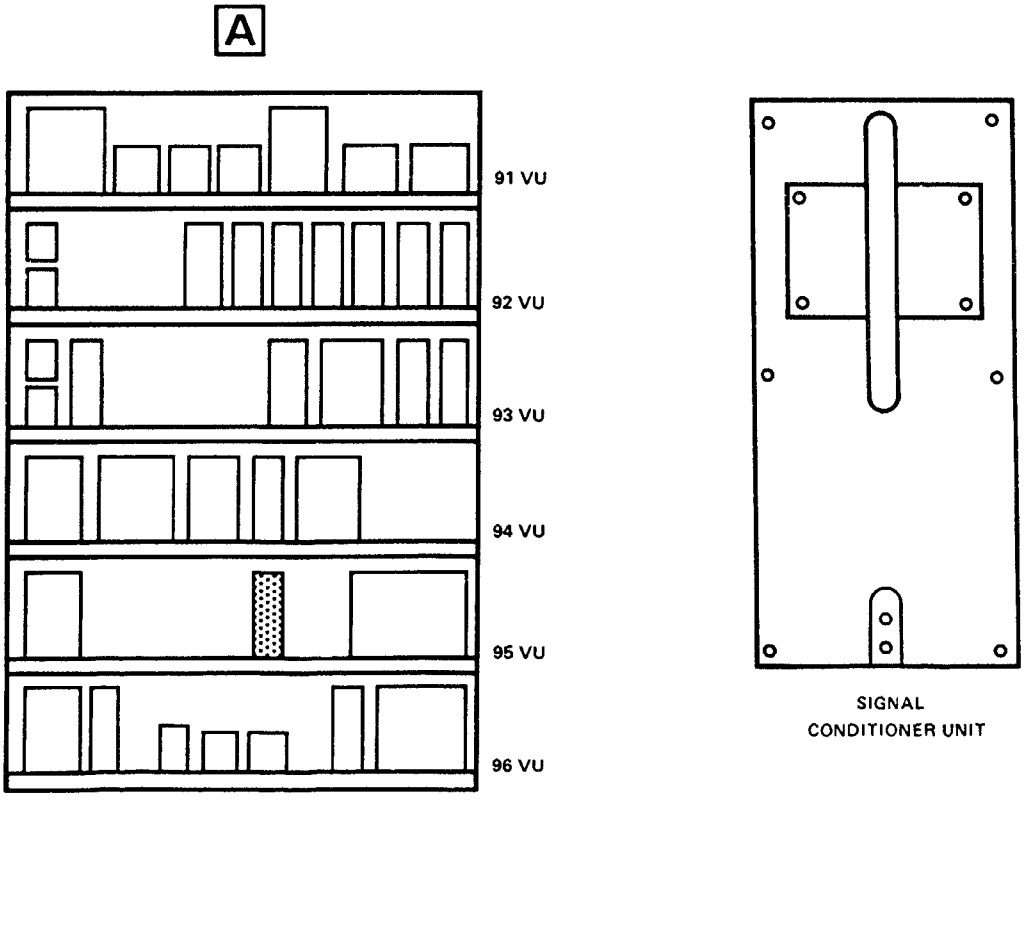
Vibration Transducer N2
Figure 002





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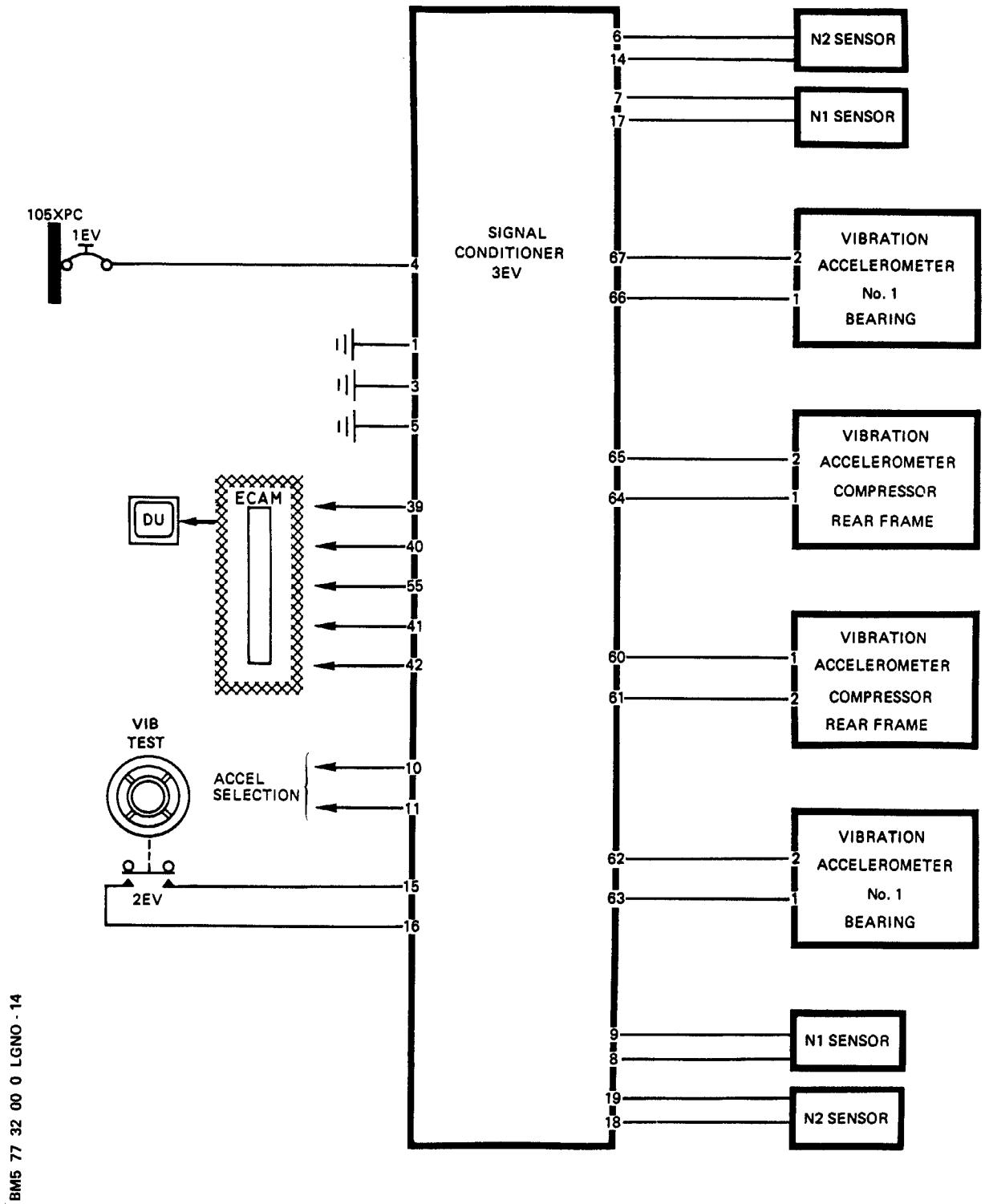
Signal Conditioner Unit Location
Figure 003



Vibration Indication - Electrical Circuit
Figure 004

4. N1 and N2 Vibration Indications

A. Description

The analog signals generated by the vibration conditioner (2 per engine) are transmitted to the **SDAC**, which transforms these signals into digital signals and transmits them by busbar to the **ECAM SGU**, **R ECAM** display unit, and **AIDS**.

Each time the engine page is displayed (automatically or manually), the vibration levels are displayed (two values in the digital form per engine).

B. Use of Vibration Indications

(1) Normal use

In normal flight conditions, the **ENGINE** and **CRUISE** pages are displayed as scheduled, except in the case where other pages must be used. The crew members must monitor the vibration level and note any significant level change with the corresponding engine speed (these indications are very useful to the maintenance).

It is important to note the vibration level increase, so that a possible increase as a function of the time may be stated.

(2) High vibration level

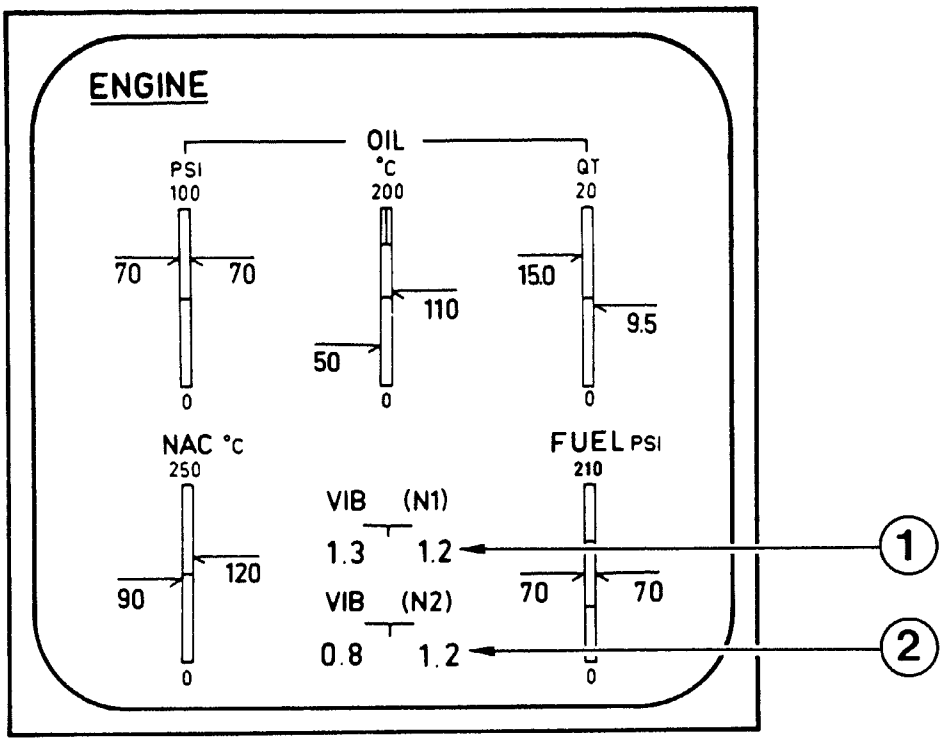
When vibration indication reaches **3** for **N1** or **5** for **N2** the engine page is displayed automatically.

The corresponding indication flashes green on the **R ECAM** display unit.

The crew members must reduce engine speed to decrease the vibration level and observe the other engine parameters to detect a possible failure.

(Ref. Fig. 005)

(Ref. Fig. 006)

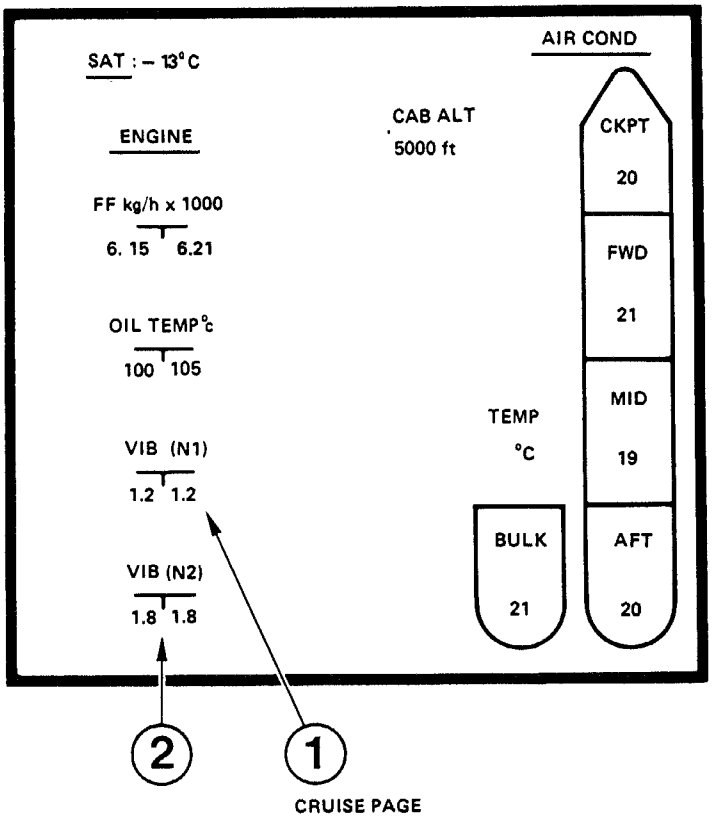


ENGINE PAGE

1. N1 VIBRATION LEVEL ENGINE 1/ENGINE 2 (GREEN)
   VIBRATION SCALE IS FROM 0 TO 10 UNITS (0 TO 6 in., sec)
   IF VIBRATION LEVEL EXCEEDS 3 UNITS INDICATION FLASHES (GREEN)
2. N2 VIBRATION LEVEL ENGINE 1/ENGINE 2 (GREEN)
   VIBRATION SCALE IS FROM 0 TO 10 UNITS (0 TO 6 in., sec)
   IF VIBRATION LEVEL EXCEEDS 5 UNITS INDICATION FLASHES (GREEN)

BM5 77 32 00 0 LJMO 14 09
DM5

Engine Vibration Indication
Figure 005



1. ENGINE VIBRATION N1 (G) FLASHES WHEN VIBRATION ⩾ 3 UNITS
2. ENGINE VIBRATION N2 (G) FLASHES WHEN VIBRATION ⩾ 5 UNITS

VIBRATION SCALE FROM 0 TO 10 UNITS (0 - 6 in./sec)

BM5 77 32 00 0 LLNO - 25 - 18
DM5

Engine Vibration Indication
Figure 006

ALTERNATE/EXTERNAL NO.1 BEARING ACCELEROMETER - REMOVAL/INSTALLATION

1. General

This procedure pertains to the removal/installation of the Alternate/ External No. 1 Bearing Accelerometer. The accelerometer is mounted on the aft end of the fan frame at the 7 o'clock position aft looking forward.

NOTE : The No. 1 bearing alternate accelerometer can stay in continuous use until the engine is removed for a shop visit that allows replacement of the No. 1 bearing internal accelerometer.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Torque Wrench 40-110 lbf. in.(0.45 - 1.24 m.daN)
Referenced Procedure - 71-13-00, P. Block 301	Cowl Doors

3. Procedure

A. Job Set-Up

(1)Open, safety and tag the following circuit breaker :

PANEL	SERVICE	IDENT.	LOCATION
133VU	ENGINES ENG 1 AND 2 V/B	1EV	334/S71

(2)Open, safety and tag the appropriate circuit breakers and open fan and thrust reverser cowl doors (Ref. 71-13-00, P. Block 301)

B. Removal (Ref. Fig. 401)

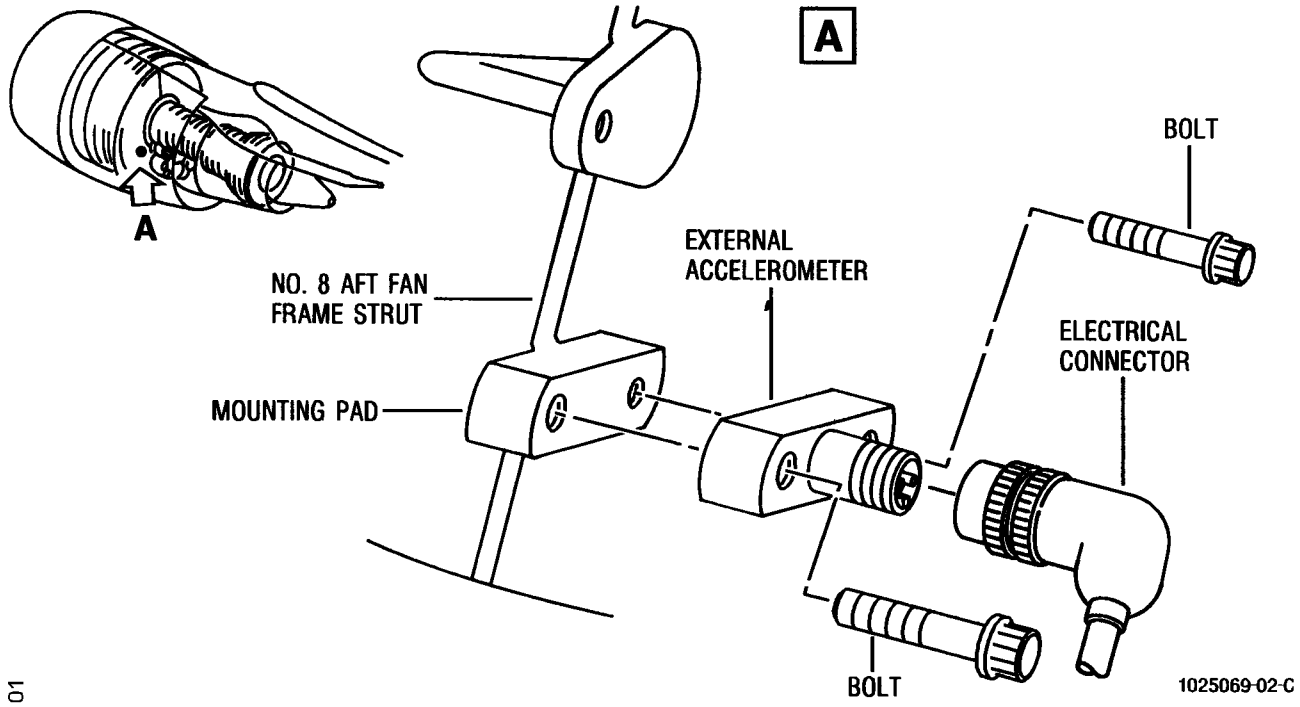
(1)Cut and remove lockwire.
(2)Disconnect accelerometer cable.
(3)Remove accelerometer from fan frame by removing the two attaching bolts.

C. Installation (Ref. Fig. 401)

(1)Install accelerometer on fan frame and secure using the two different diameter bolts. TORQUE smaller diameter bolt to between 40 and 60 lbf.in.(0.45 and 0.68 m.daN) and the larger diameter bolt to between 70 and 110 lbf.in.(0.79 and 10.24 m.daN).
(2)Connect cable connector to accelerometer. Tighten fingertight and wirelock.

D. Close-Up

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Remove safety clips and tags and close the apropriate circuit breakers, close fan and thrust reverser cowl doors (Ref. 71-13-00, P. Block 301).



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Alternate/External No.1 Bearing Accelerometer
Removal/Installation
Figure 401

ALTERNATE/EXTERNAL No. 1 BEARING ACCELEROMETER - INSPECTION/CHECK

1. General

This procedure pertains to the inspection and check of the Alternate/External No. 1 Bearing Accelerometer

2. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
R B.Material No.C04-035	Cleaning Compounds and Solvents (Ref. 70-00-00)
Referenced Procedures	
- 71-13-00, P. Block 301	Cowl Doors
R - 72-32-00, P. Block 601	Compressor Variable Stator Assembly
- 77-32-01, P. Block 401	Alternate/External No. 1 Bearing Accelerometer

3. Procedure

A. Job Set-Up

(1)Open, safety and tag the circuit breakers for the appropriate engine and open fan and thrust reverser cowl doors.

(2)Remove alternate/external No. 1 bearing accelerometer (Ref. 77-32-01, P. Block 401).

B. Visually inspect the following :

R INSPECT/CHECK	MAXIMUM SERVICEABLE LIMITS	REMARKS
R (1)The accelerometer body for :		
R (a)Cracks	Not serviceable	Replace the accelerometer.
R (b)Deformations or dents	0.04 in. (1.0 mm) depth or less	Replace the accelerometer.
R (2)The connector for :		
R (a)Nicked threads	Any amount not beyond the complete depth of the thread	Chase threads if within limits or replace the accelerometer.
R (b)Cross-thread damage	Not serviceable	Replace the accelerometer.
R (c)Bent pins	Not serviceable	Replace the accelerometer.
R (d)Arcing between	Not serviceable	Replace the

INSPECT/CHECK	MAXIMUM SERVICEABLE LIMITS	REMARKS
pins		accelerometer.
(e)Dirt inside the electrical connector	Not serviceable	Clean the connector with isopropyl alcohol, Material No.C04-035 and a soft bristle brush.
(f)Radial cracks, dents or deformations across the end of the electrical connector	Not serviceable	Replace the accelerometer.
(g)Heat discoloration, swollen and/or missing interfacial seal	Not serviceable	Replace the accelerometer. Inspect stage 5 VSV lever arm for vane trunnion metal-to-metal contact (Ref. 72-32-00, P. Block 601).

C. Do an insulation resistance test on the No. 1 alternate/external accelerometer as follows :

(1)Using an ohmmeter, measure the insulation resistance between the following points on the accelerometer connector :

(a)Pin A (+) to pin B (-)

(b)Pin A (+) to shield

(c)Pin B (-) to shield.

(2)Insulation resistance must be greater than 100 Meghoms at room temperature for each measurement.

(3)If the resistance is less than the necessary value, this is evidence that the accelerometer is bad.

(4)Make sure that the connector is free of dirt and water. Clean the connector with isopropyl alcohol, Material No.C04-035 and allow it to dry.

(5)Recheck the resistance values. If the resistance is still less than the necessary value, replace the accelerometer (Ref. 77-32-01, P. Block 401).

D. Close-Up

(1)Install alternate/external No. 1 bearing accelerometer (Ref. 77-32-01, P. Block 401).

(2)Remove safety clips and tags and close circuit breakers. Close thrust reverser and fan cowl doors (Ref. 71-13-00, P. Block 301).

CRF EXTERNAL ACCELEROMETER AND MOUNTING BRACKET - REMOVAL/INSTALLATION

1. General

The compressor rear frame (CRF) external accelerometer and mounting bracket are mounted on the compressor stator rear flange at the 10:30 o'clock position aft looking forward.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Corrosion - Resistant Steel Lockwire
C.	Torque Wrench 15 - 70 lbf. in. (0.17 - 0.79 m.daN.)
D.	Access Platform
Referenced Procedure - 71-13-00, P. Block 301	Cowl Doors

3. Procedure

A. Job Set-Up

(1)Open, safety and tag the following circuit breaker

PANEL	SERVICE	IDENT.	LOCATION
133VU	ENGINES/ENG 1 & 2/VIB	1EV	334/S71

(2)Open, safety and tag circuit breakers for the appropriate engine and open fan, thrust reverser and core cowl doors (Ref. 71-13-00, P. Block 301).

(3)Install access platform.

B. Removal of the Accelerometer and Mounting Bracket (Ref. Fig. 401, 402)

(1)Disconnect the cable at the connector located on the bracket on the B-sump vent tube by removing jam nut.

(2)Remove the 2 bolts, nuts and loop clamps securing the cable to the B-sump vent tube.

(3)Remove the 3 bolts securing the accelerometer to its mounting bracket on the rear flange of the compressor rear frame.

(a)Remove the accelerometer.

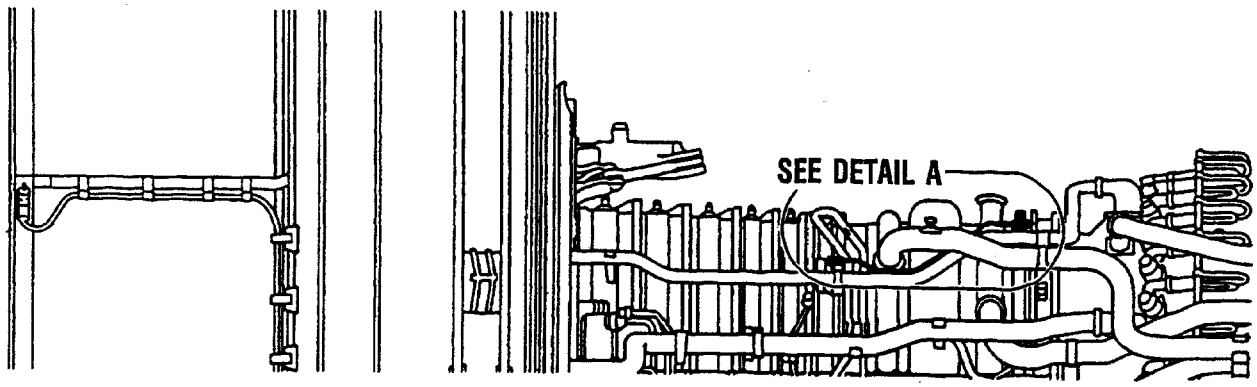
(4)Remove the bolts and nuts that attach the mounting bracket to the rear flange of the compressor rear frame.

(a)Remove the mounting bracket.

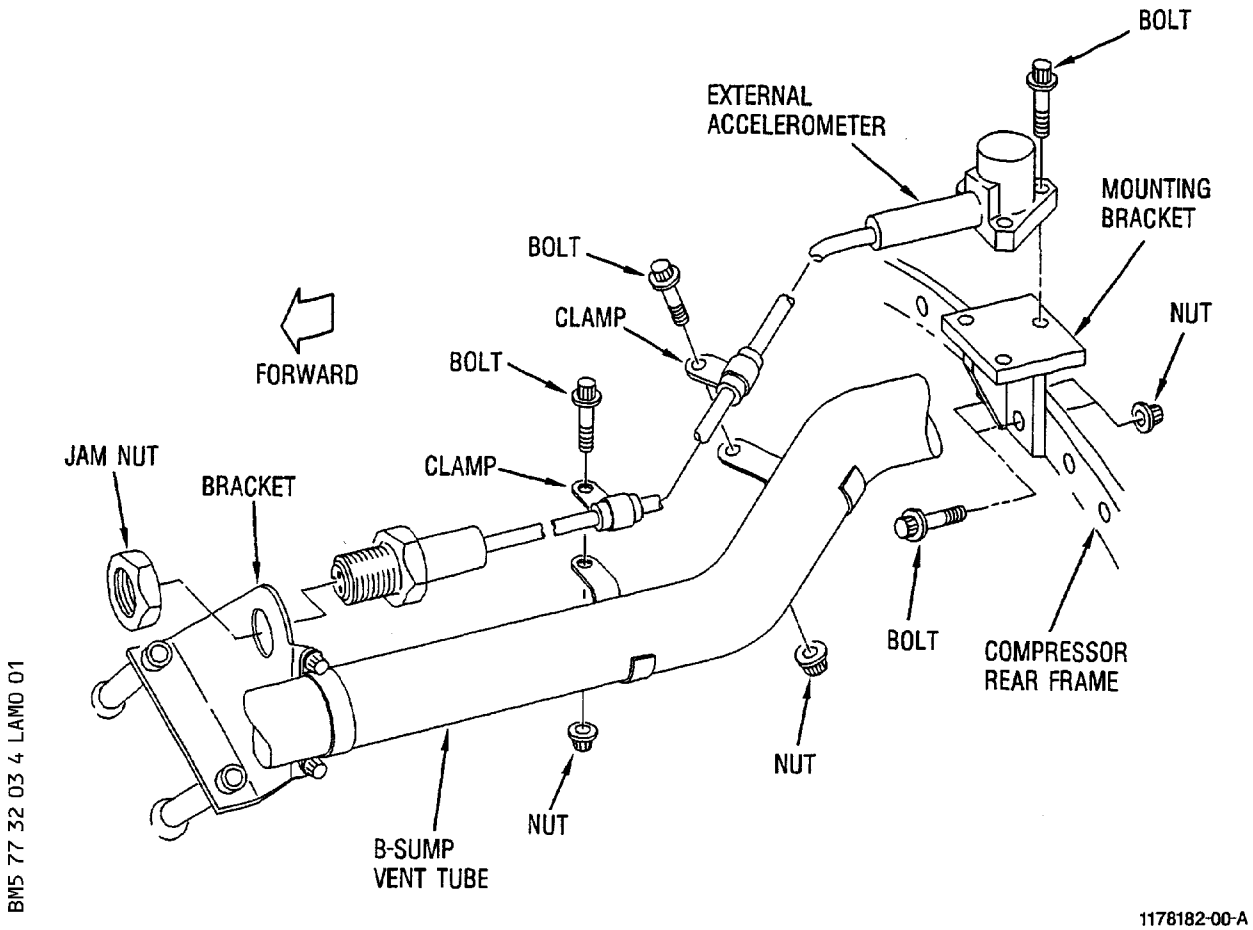
C. Installation of the Accelerometer and Mounting Bracket (Ref. Fig. 401, 402)

(1)Install the mounting bracket on the rear flange of the compressor rear frame with bolts and nuts.

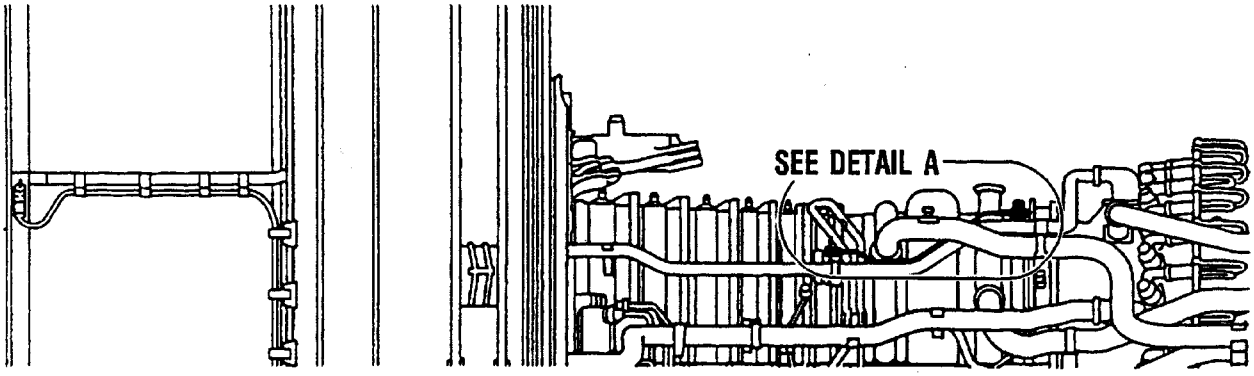
(a)TORQUE the bolts and nuts to between 190 and 230 lbf.in. (2.15 and 2.60 m.daN).



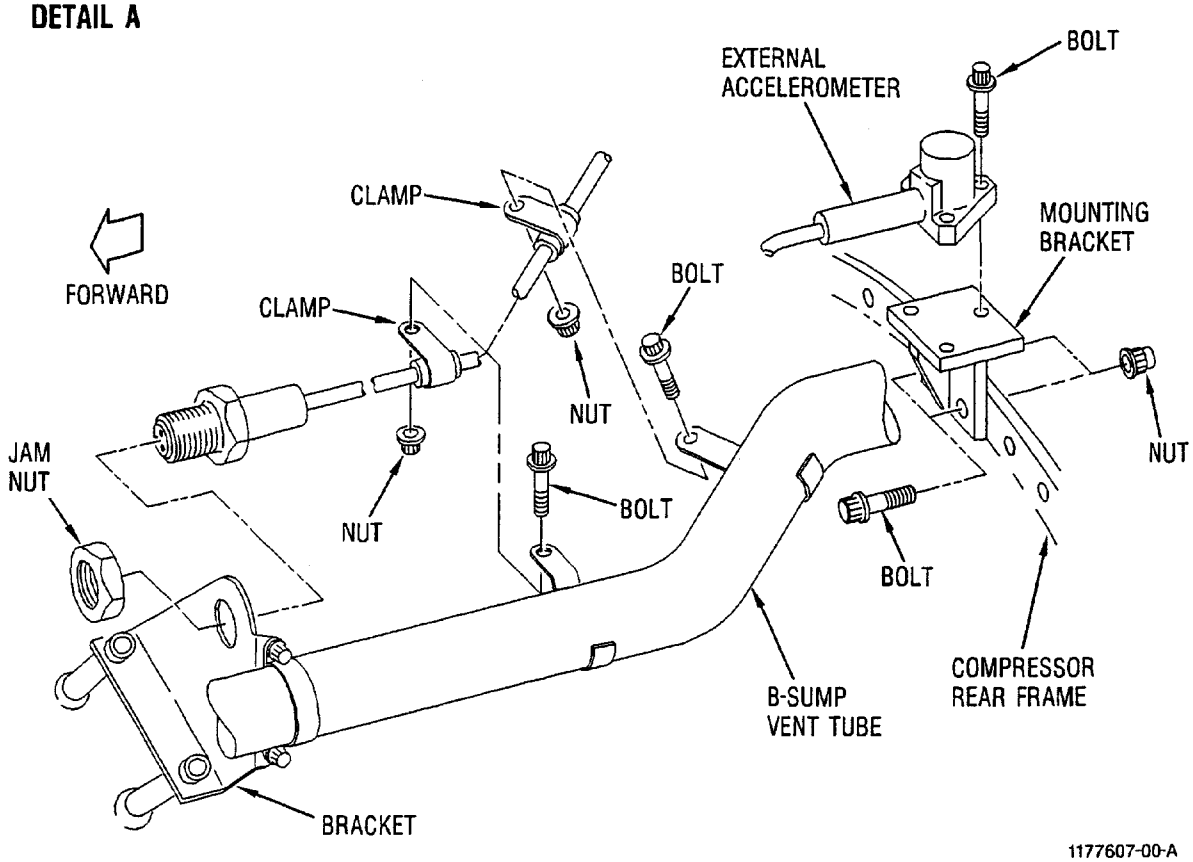
DETAIL A



CRF External Accelerometer (Pre SB GE 72-0851)
Figure 401



DETAIL A



BM5 77 32 03 4 LCM0 00

CRF External Accelerometer (Post SB GE 72-0851)
Figure 402

(2)Mount the accelerometer on its bracket on the compressor stator rear flange and secure with 3 bolts. TORQUE bolts to between 55 and 70 lbf.in. (0.62 and 0.79 m.daN).

Pre SB GE 77-049

(3)Connect cable at the connector located on the mounting bracket on the B-sump vent tube with a jam nut. TORQUE nut to between 15 and 20 lbf.in. (0.17 and 0.23 m.daN) and wirelock.

End Pre SB GE 77-049

Post SB GE 77-049

(3)Connect cable at the connector located on the mounting bracket on the B-sump vent tube with a jam nut. TORQUE nut to between 100 and 130 lbf.in. (1.13 and 1.47 m.daN) and wirelock.

End Post SB GE 77-049

(4)Secure cable to B-sump vent tube with 2 bolts, nuts and loop clamps. TORQUE bolts to between 24 and 27 lbf.in. (0.27 and 0.31 m.daN).

(5)Do a check of the AVM system.

D. Close-Up

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2)Remove access platform.

(3)Remove safety clips and tags and close related circuit breakers, together with circuit breaker 1EV.
Close core, thrust reverser and fan cowl doors. (Ref. 71-13-00, P. Block 301).

CRF EXTERNAL ACCELEROMETER AND MOUNTING BRACKET - INSPECTION/CHECK

1. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
R B.Material No.C04-035	Cleaning Compounds and Solvents
R	(Ref. 70-00-00)
Referenced Procedures	
- 71-13-00, P. Block 301	Cowl Doors
R - 72-32-00, P. Block 601	Compressor Variable Stator Assembly
- 77-32-03, P. Block 401	CRF External Accelerometer

R 2. Procedure (Ref. Fig. 601)

A. Job Set-Up
(1)Open safety and tag the circuit breakers for the appropriate engine and open fan thrust reverser and core cowl doors (Ref. 71-13-00, P. Block 301).
(2)Remove CRF external accelerometer and mounting bracket (Ref. 77-32-03, P. Block 401).

B. Visually inspect the following :

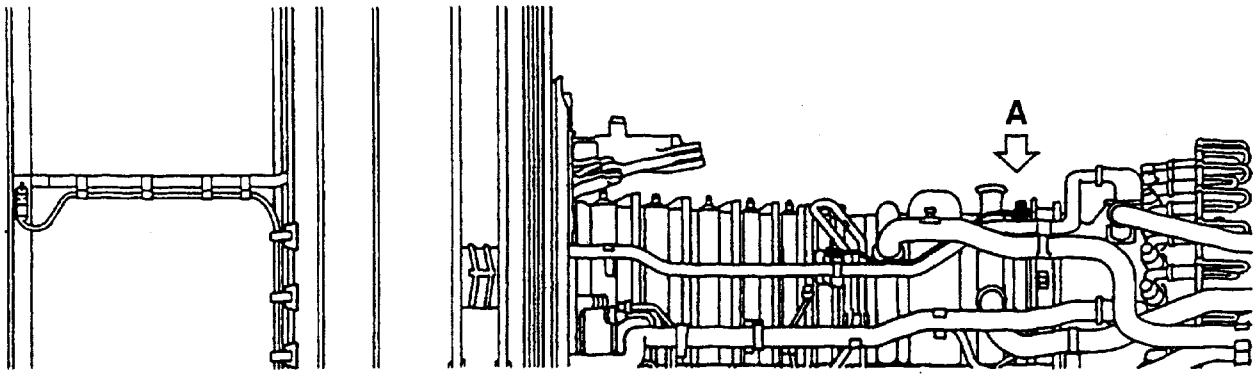
INSPECT/CHECK	MAXIMUM SERVICEABLE LIMITS	REMARKS
R (1) Accelerometer body for :		
R (a)Cracks	Not serviceable	Replace the accelerometer
R (b)Deformations or dents	0.04 in. (1 mm) depth or less	Replace the accelerometer
R (c)Nicks or scratches	Any amount and size not through the housing wall	Replace the accelerometer
R (d)Cracks around the mount holes	Not serviceable	Replace the accelerometer
R (2) Bracket mounting face for :		
R (a)Nicks or dings	Not serviceable	Replace the accelerometer
R (b)Scratches	0.04 in. (1 mm) depth or less	Replace the accelerometer
R (c)High metal	Not serviceable	Replace the accelerometer
R (3) Electrical connector for :		
R (a)Cracks	Not serviceable	Replace the accelerometer
R (b)Nicked threads	Any amount not beyond the complete depth of the	Chase thread if within limits

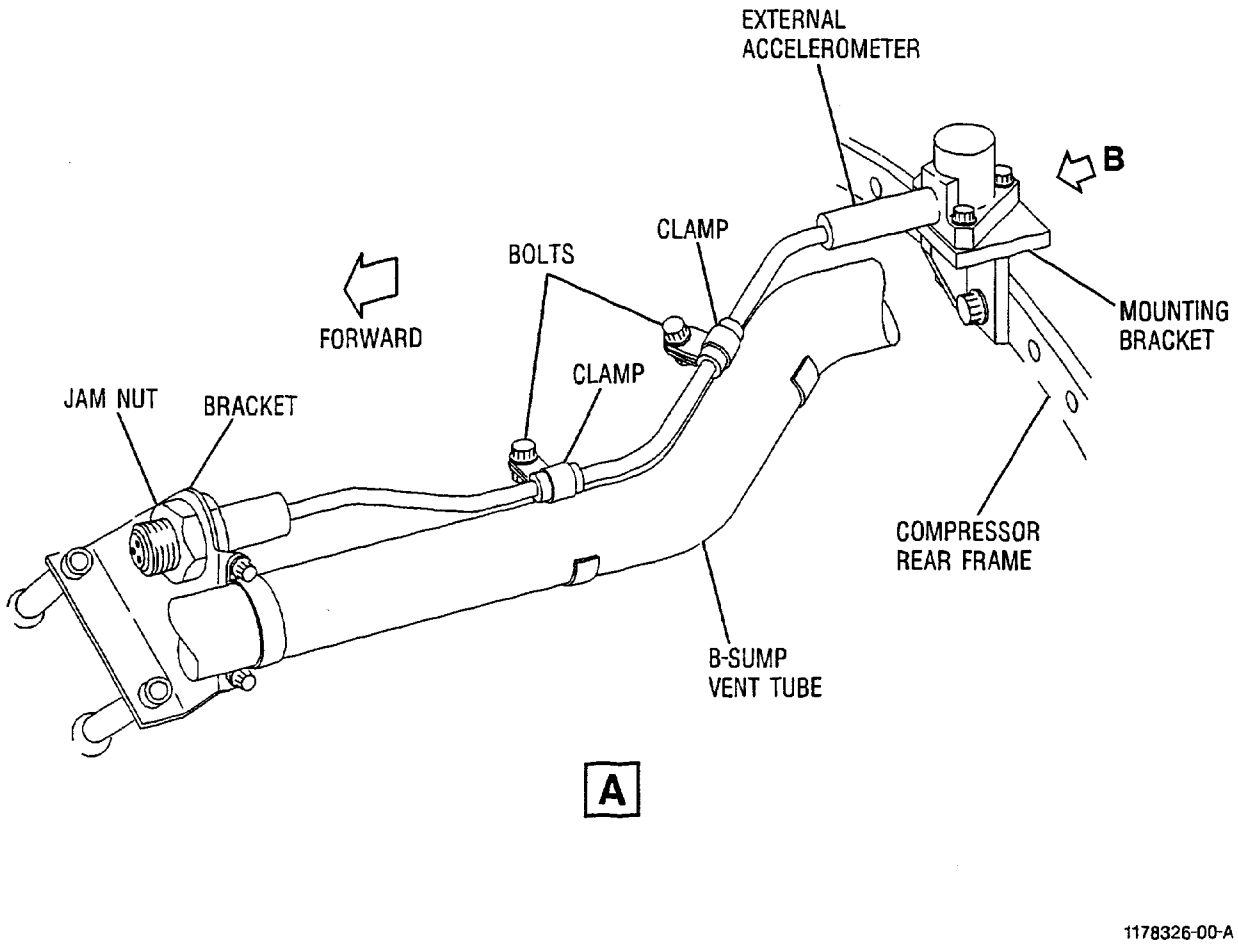
INSPECT/CHECK	MAXIMUM SERVICEABLE LIMITS	REMARKS
	thread	or replace the accelerometer
(c)Cross-thread damage	Not serviceable	Replace the accelerometer
(d)Bent or loose pins	Not serviceable	Replace the accelerometer
(e)Arcing between pins	Not serviceable	Replace the accelerometer
(f)Dirt in the connector	Not serviceable	Clean the connector with Material No.C04-035 and soft bristle brush
(g)Radial cracks, dents, or deformations across the end of the connector	Not serviceable	Replace the accelerometer
(h)Heat discoloration, swollen, and/or missing interfacial seal	Not serviceable	Connect the electrical connector to the alternate/external No. 1 bearing accelerometer. Inspect stage 5 VSV lever arm for vane trunion metal-to-metal contact (Ref. 72-32-00, P. Block 601)
(4) Accelerometer cable for :		
(a)Cracking, chafing, or wear of the wire overbraid	Any amount if bare wire is not exposed	Replace the accelerometer
(b)Internally cracked conductor cable at wear location or cable ends	Not serviceable	Replace the accelerometer
(5) Mounting bracket for :		
(a)Nicks, dents, scratches, and raised rivet heads on bracket top surface	Not serviceable	Remove high metal with stone
(b)Nicks, dents, and scratches on spacer	Less than 25% of total spacer surface area or less than 25% of total	Remove high metal with stone

INSPECT/CHECK	MAXIMUM SERVICEABLE LIMITS	REMARKS
R surfaces	thickness between spacer ID or OD	
R	More than 25% of total spacer surface area or more than 25% of total thickness between spacer ID or OD	Replace the mounting bracket
R (c)100% fillet welds at intersection of adjoining surfaces	Not serviceable	Replace the mounting bracket
R (d)Damaged threads for accelerometer mounting	Not serviceable	Replace the mounting bracket

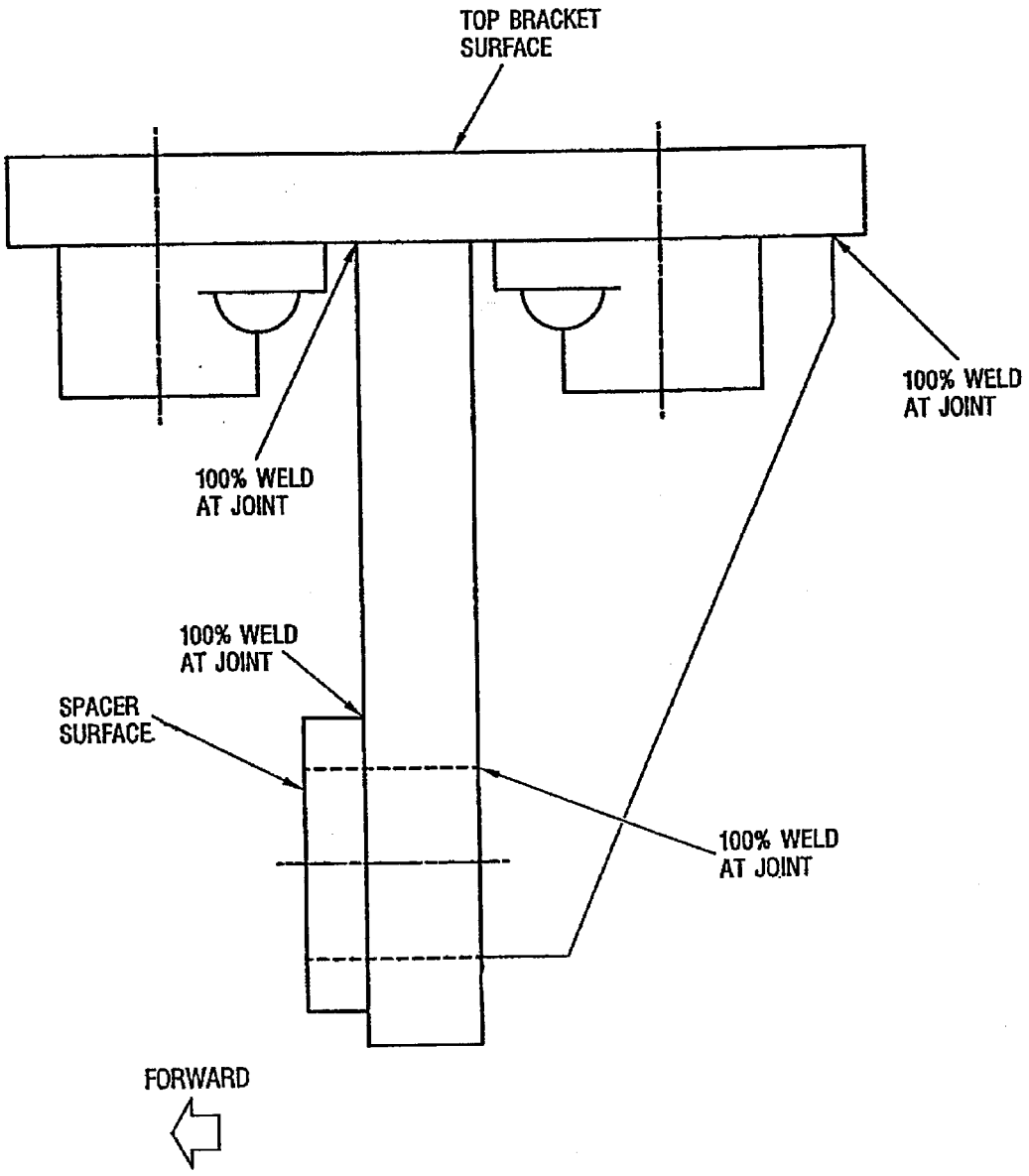
R C. Do an insulation resistance test of the CRF accelerometer as follows :
R (1)Using an ohmmeter, measure the insulation resistance between the following points on the accelerator connector.
R (a) Pin A (+) to Pin B (-)
R (b) Pin A (+) to shield
R (c) Pin B (-) to shield
R (2)Insulation resistance must be greater than 1 Megohms at room temperature for each measurement.
R (3)If the resistance is less than the necessary value, this is evidence that the accelerometer is bad.
R (4)Make sure that the connector is free of dirt and water. Clean the connector with Material No.C04-035 and allow it to dry.
R (5)Re-check the resistance values. If the values are still less than the necessary values, replace the accelerometer (Ref. 77-32-03, P. Block 401).

R D. Close-Up
(1)Install accelerometer and mounting bracket (Ref. 77-32-03, P. Block 401).
(2)Remove safety clips and tags and close circuit breakers, close core, thrust reverser and fan cowl doors (Ref. 71-13-00, P. Block 301).





CRF External Accelerometer (Sheet 1/2)
Figure 601



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CRF External Accelerometer (Sheet 2/2)
Figure 601

R

NO. 1 BEARING ACCELEROMETER LOCKING PLATE - REMOVAL/INSTALLATION

1. General

A. This procedure contains the instructions for the removal and installation of the No. 1 bearing (alternate) accelerometer locking plate.

B. The No. 1 bearing accelerometer (the accelerometer) is located at the 7:00 o'clock position at the aft end of the fan frame.

C. Access to the accelerometer is through the left thrust reverser door.

D. Unless different instructions are given, these procedures are the same for both G.E. CF6-80C2 engines.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Torque Wrench 30-200 in-lb (3.4-22.6 N.m)
C.Material No.C04-035	Cleaning Compounds and Solvents (Ref. 70-00-00)
D.Material No.C02-058	Anti-Seize Compounds, Lubricants, Oils (Ref. 70-00-00)
E.Material No.C10-071	Miscellaneous (Ref. 70-00-00)
Referenced Procedure - 71-13-00, P. Block 301	Cowl Doors

(Ref. Fig. 401)

3. Procedure

A. Job Set-up

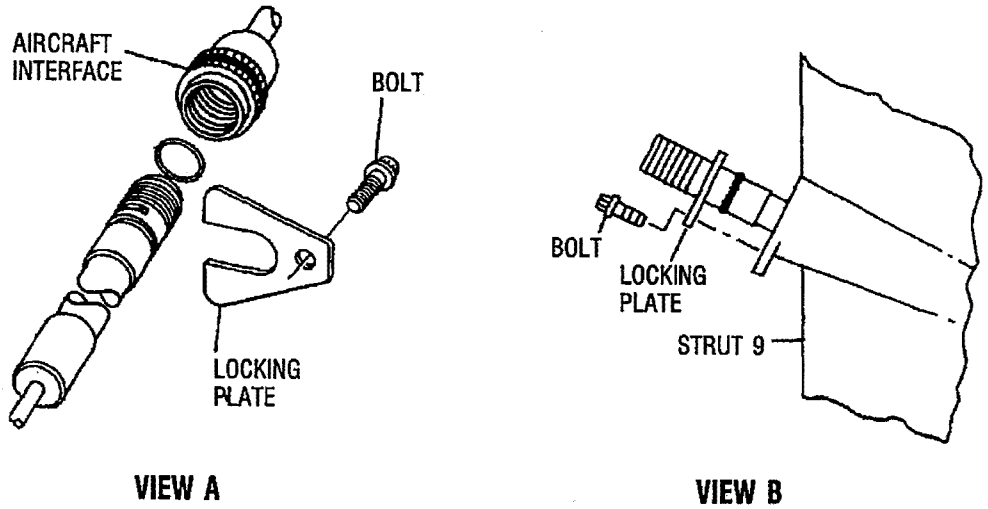
WARNING : MAKE SURE YOU OPEN, TAG, AND SAFETY THE APPLICABLE CIRCUIT BREAKERS BEFORE YOU START THE MAINTENANCE PROCEDURES. THIS WILL PREVENT ACCIDENTAL ENGINE START OR THRUST REVERSER OPERATION WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

WARNING : TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1)Open, safety, and tag the following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
133VU	ENGINES ENG 1 AND 2 V/B	1EV	334/S71

(2)Open, safety and tag the appropriate circuit breakers and open fan and thrust reverser cowl doors (Ref. 71-13-00, P. Block 301).



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Locking Plate
Figure 401

B. Removal of the No. 1 Bearing Accelerometer Locking Plate
(Ref. Fig. 401)
(1)Remove the safety wire from the accelerometer locking plate bolt and discard.
(2)Remove the bolt that attaches the locking plate and the accelerometer to the fan frame strut. Discard the bolt.
(3)Remove the locking plate from the accelerometer. Discard the locking plate.

C. Installation of the No. 1 Bearing Accelerometer Locking Plate
(Ref. Fig. 401)
(1)Make sure that this circuit breaker is open and has a safety tag :

PANEL	SERVICE	IDENT.	LOCATION
133VU	ENGINES ENG 1 AND 2 V/B	1EV	334/S71

(2)Open, safety and tag the appropriate circuit breakers and open fan and thrust reverser cowl doors (Ref. 71-13-00, P. Block 301).
WARNING : ISOPROPYL ALCOHOL, MATERIAL NO.C04-035 IS TOXIC AND FLAMMABLE. USE PERSONAL PROTECTION EQUIPMENT. USE IN A WELL-VENTILATED AREA.
(3)Clean the mounting faces of the new locking plate with Isopropyl Alcohol, Material No.C04-035 or equivalent and let it dry.
(4)Slide the new locking plate onto the slots in the accelerometer.
WARNING : THREAD COMPOUND LUBRICATING GREASE, MATERIAL NO.C02-058 IS FLAMMABLE AND IS AN IRRITANT. AVOID PROLONGED CONTACT WITH THE SKIN. DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES. USE IN AN AREA OPEN TO AIR. CLOSE THE CONTAINER WHEN NOT USED.
(5)Apply lubricant, Material No.C02-058 to the threads of the new bolt.
(6)Secure the accelerometer to the aft side of the fan frame strut with the locking plate and the bolt. TORQUE the bolt to between 55 and 70 lbf.in (0.63 and 0.79 m.daN). Safety the bolt with wire, Material No.C10-071.

D. Close-up
(1)Remove all the tools and equipment from the work area. Make sure the work area is clean.
(2)Remove safety clips and tags and close the appropriate circuit breakers.
(3)Close fan and thrust reverser cowl doors (Ref. 71-13-00, P. Block 301).

ENGINE VIBRATION SIGNAL CONDITIONER UNIT - REMOVAL/INSTALLATION

1. General

The engine vibration signal conditioner unit is installed in the avionics compartment, rack 90VU shelf 95VU.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breakers Safety Clips
B.	Blanking Caps/Plugs
Referenced Procedure - 24-41-00, P. Block 301	AC External Power Control

3. Procedure

A. Job Set-Up

(1)Open safety and tag the following circuit breaker :

PANEL	SERVICE	IDENT.	LOCATION
123VU	ENGINES/ENG1 & 2/VIB	1EV	303/C59

B. Removal (Ref. Fig. 401)

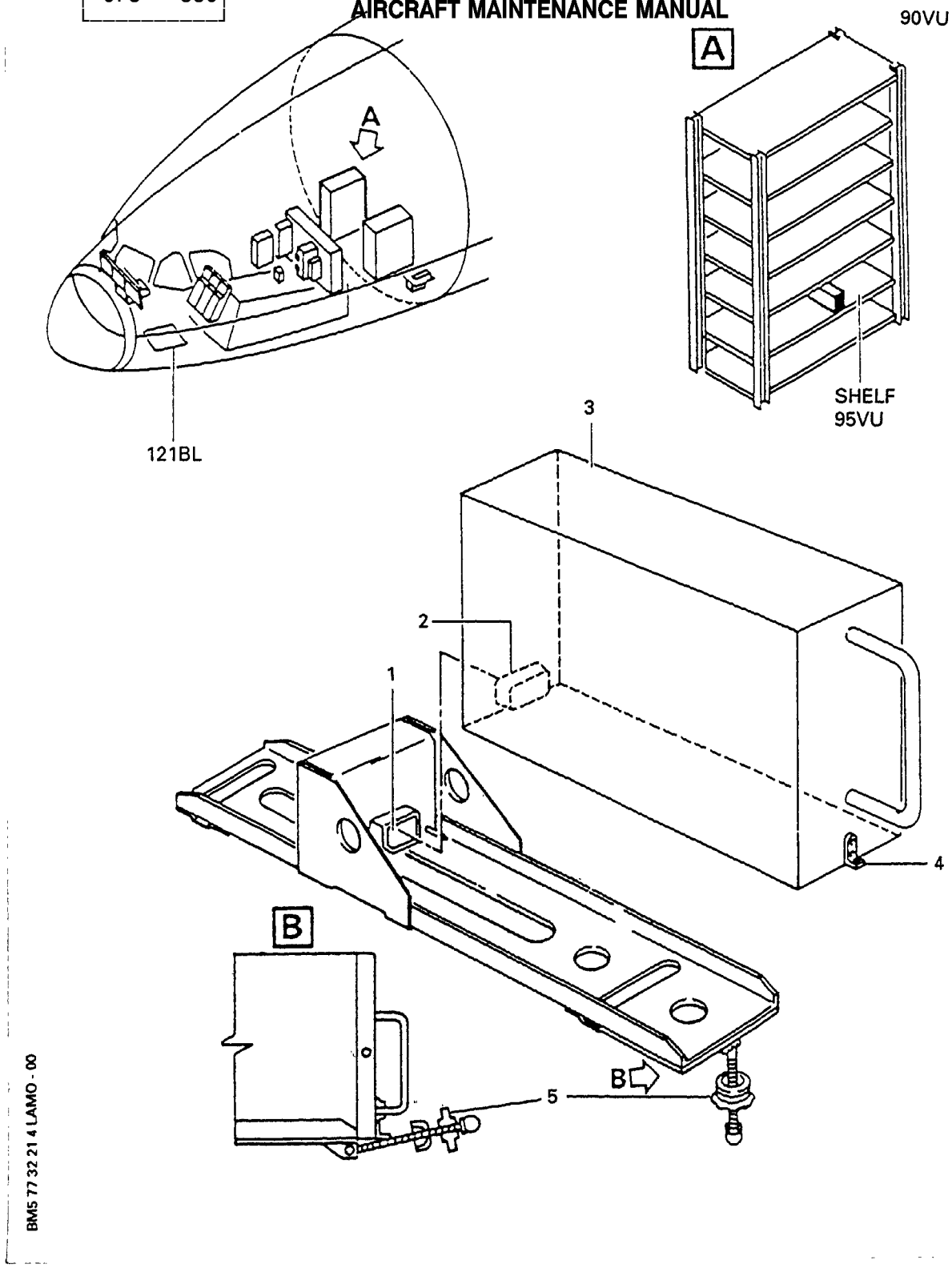
(1)Loosen knurled retaining nut (5) until stud (4) is freed.
(2)Withdraw signal conditioner unit (3) from mount by lightly pulling handle so as to free back connector (1) and locating pins.
(3)Cap electrical connector (1) on mount and electrical connector (2) on signal conditioner unit.

C. Installation (Ref. Fig. 401)

(1)Clean and inspect signal conditioner unit interface and mount.
(2)Remove blanking caps from electrical connector (1) on mount and electrical connector (2) on signal conditioner unit.
(3)Check electrical connectors and locating pins for correct condition.
(4)Push in signal conditioner unit slowly on mount, making certain that electrical connectors and locating pins insert correctly.
(5)Lift knurled retaining nut (5) into position on stud (4).
(6)Tighten knurled retaining nut (5) until signal conditioner unit is fully home.
(7)Remove safety clip and tag and close circuit breaker 1EV.

D. Test

(1)Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
(2)Make certain that electronics rack ventilation is correct.
(3)Make certain that ECAM circuit breakers are closed.
(4)On center pedestal, ECAM control panel, select engine page by pressing ENG pushbutton switch.
(5)On lateral panel 472VU, press VIB TEST pushbutton switch.



Signal Conditioner Unit
Figure 401

(6)On R ECAM display unit check that :
VIB (N1) : 8 CPU ± 0.4 CPU
VIB (N2) : 8 CPU ± 0.4 CPU

E. Close-Up
(1)De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

NO. 1 BEARING ACCELEROMETER - INSPECTION/CHECK

1. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Brush, Soft Bristle
C.Material No.C04-035	Cleaning Compounds and Solvents (Ref. 70-00-00)
Referenced Procedures	
- 71-13-00, P. Block 301	Cowl Doors
- 72-32-00, P. Block 601	Compressor Variable Stator Assembly
- 77-32-01, P. Block 401	Alternate/External No. 1 Bearing Accelerometer
- 77-32-04, P. Block 401	No. 1 Bearing Accelerometer Locking Plate

2. Procedure

(Ref. Fig. 601)

A. Job Set-up

WARNING : MAKE SURE YOU OPEN, TAG, AND SAFETY THE APPLICABLE CIRCUIT BREAKERS BEFORE YOU START THE MAINTENANCE PROCEDURES. THIS WILL PREVENT ACCIDENTAL ENGINE START OR THRUST REVERSER OPERATION WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

WARNING : TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1)Open, safety and tag the circuit breakers for the appropriate engine and open fan and thrust reverser cowl doors (Ref. 71-13-00, P. Block 301).

(2)Disconnect the cable accelerometer connector.

B. Clean the accelerometer with isopropyl alcohol Material No.C04-035 and allow it to air dry.

C. Visually inspect the following :

R

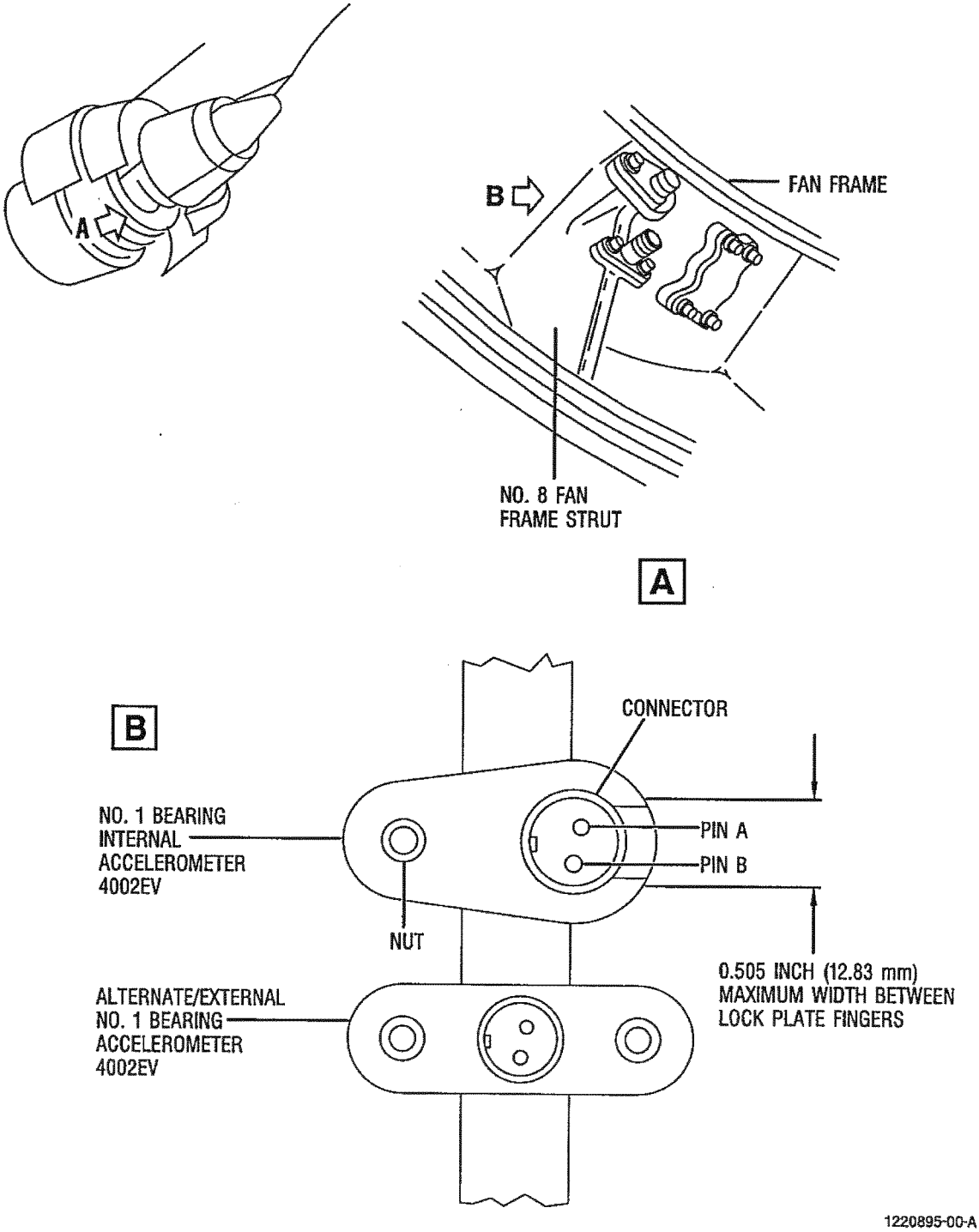
INSPECT/CHECK	MAXIMUM SERVICEABLE LIMITS	REMARKS
(1)Examine the accelerometer case for :		
(a)Cracks	Not serviceable	Connect the electrical connector to the alternate/external No. 1 bearing accelerometer.
(b)Dents and/or deformations	0.04 in. (1.0 mm) depth or less	Connect the electrical connector to the alternate/external No. 1 bearing accelerometer.

INSPECT/CHECK	MAXIMUM SERVICEABLE LIMITS	REMARKS
(2)Examine the connector for :		
(a)Nicked threads	Any amount not beyond the complete depth of the thread	Chase threads if within limits or replace the accelerometer.
(b)Cross-thread damage	Not serviceable	Connect the electrical connector to the alternate/external No. 1 bearing accelerometer.
(c)Bent pins	Not serviceable	Connect the electrical connector to the alternate/external No. 1 bearing accelerometer.
(d)Arcing between pins	Not serviceable	Connect the electrical connector to the alternate/external No. 1 bearing accelerometer.
(e)Dirt inside the electrical connector	Not serviceable	Clean the connector with isopropyl alcohol, Material No.C04-035 and a soft bristle brush.
(f)Radial cracks, dents, or deformations across the end of the electrical connector	Not serviceable	Connect the electrical connector to the alternate/external No. 1 bearing accelerometer.
(g)Heat discoloration, swollen and/or missing interfacial seal	Not serviceable	Connect the electrical connector to the alternate/external No. 1 bearing accelerometer. Inspect stage 5 VSV lever arm for vane trunion metal-to-metal contact (Ref. 72-32-00, P. Block 601).
(3)Examine the lock plate for :		
(a)Width between fingers greater than 0.505 inch (12.83 mm)	Not serviceable	Connect the electrical connector to the alternate/external No. 1 bearing accelerometer.

INSPECT/CHECK	MAXIMUM SERVICEABLE LIMITS	REMARKS
		Replace the lock plate (Ref. 77-32-04, P. Block 401).

D. Do an insulation resistance test on the No. 1 bearing accelerometer as follows :
(1)Using an ohmmeter, measure the insulation resistance between the following points on the accelerometer connector :
(a)Pin A (+) to pin B (-)
(b)Pin A (+) to shield
(c)Pin B (-) to shield.
(2)Insulation resistance must be greater than 100 Megohms at room temperature for each measurement.
(3)If the resistance is less than the necessary value, this is evidence that the accelerometer is bad.
(4)Make sure that the connector is free of dirt and water. Clean the connector with isopropyl alcohol Material No.C04-035 and allow it to dry.
(5)Recheck the resistance values. If the resistance is still less than the necessary value, connect the electrical connector to the alternate/external No. 1 bearing accelerometer (Ref. 77-32-01, P. Block 401).

E. Close-up
(1)Connect the electrical connector to the No. 1 bearing internal accelerometer. Tighten the electrical connector with your hand, and then tighten beyond finger tight with soft-jawed pliers until the soft-jawed pliers slip. This is approximately 1/2 turn beyond finger tight.
(2)Remove safety clips and tags and close circuit breakers.
(3)Close thrust reverser and fan cowl doors (Ref. 71-13-00, P. Block 301).



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No. 1 Bearing Internal Accelerometer
Figure 601